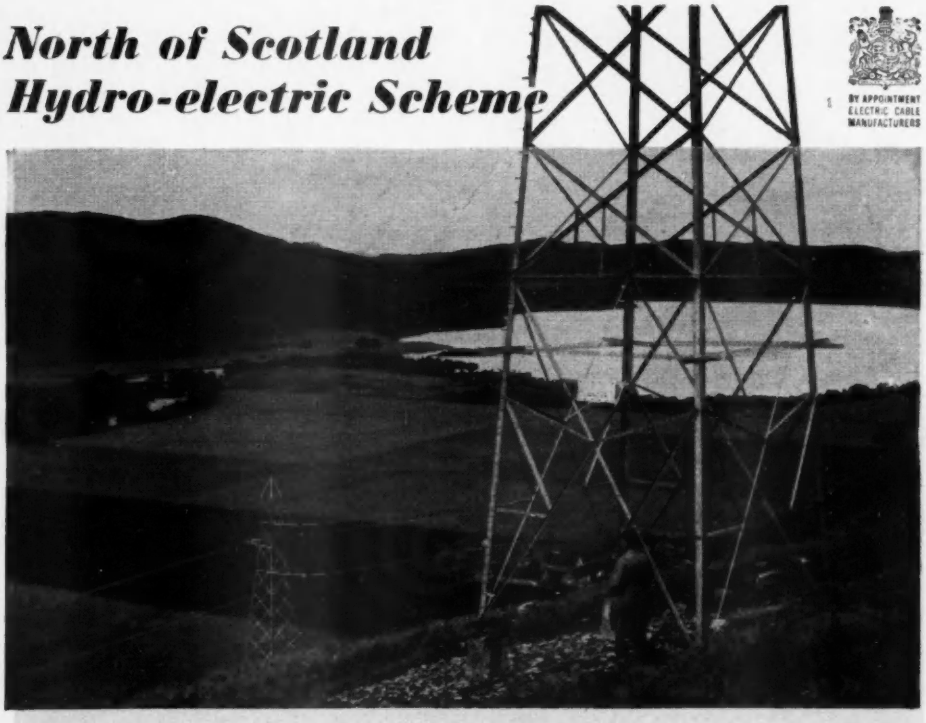
ELECTRICAL TIMES

THURSDAY
19 APRIL
1951
SIXPENCE

North of Scotland Hydro-electric Scheme

BY APPOINTMENT
ELECTRIC CABLE
MANUFACTURERS



The supply and erection of some ninety miles of 132kV overhead transmission lines, over the wild and rugged Highlands, was recently entrusted to Henley's Contract Department, by the North of Scotland Hydro-Electric Board. For some sixteen miles between Grudie Bridge and Beauly, the system is split into twin single circuit lines, running parallel at a distance of 150 ft. apart, to minimise effect of lightning storms prevalent in this area. Illustration shows HENLEY towers in this section of the line, near Loch Garve.

Consultants:
Messrs. Kennedy and Donkin

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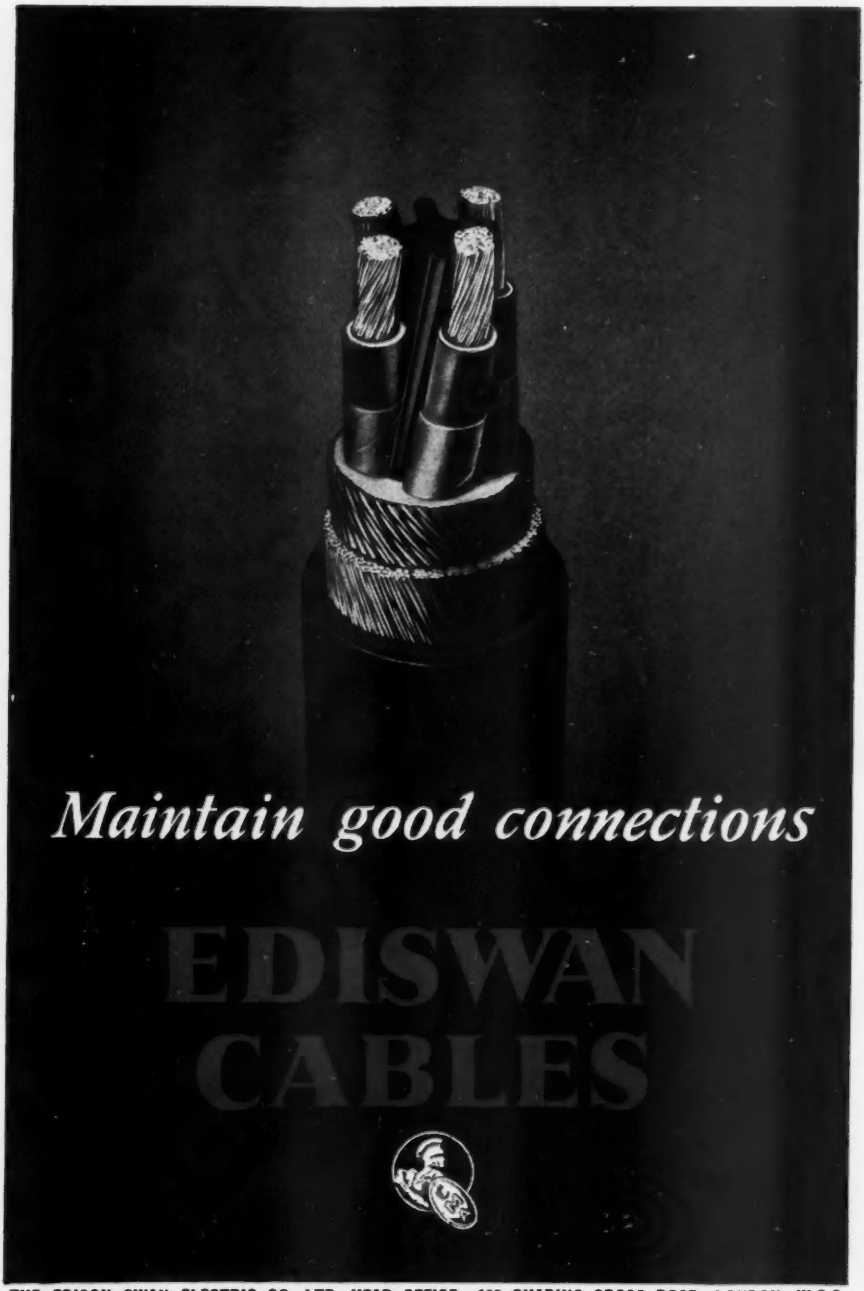

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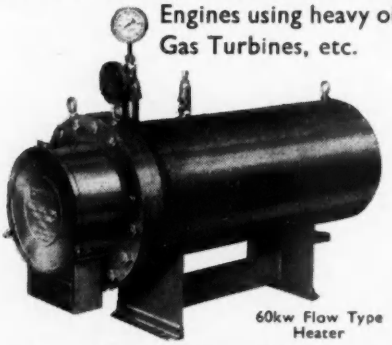

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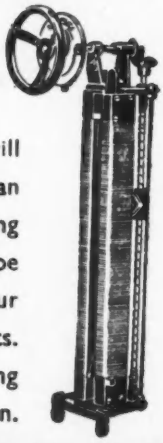

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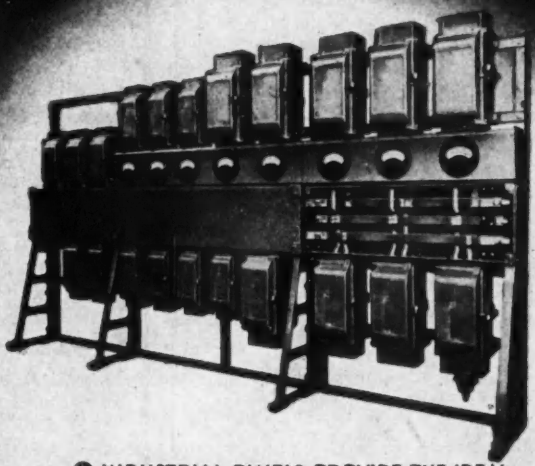

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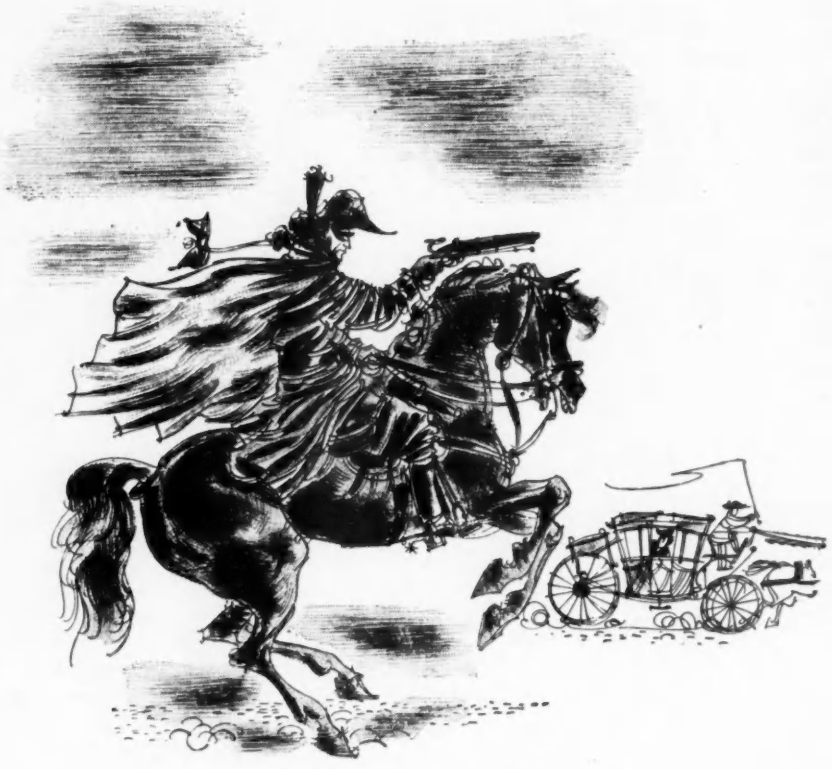

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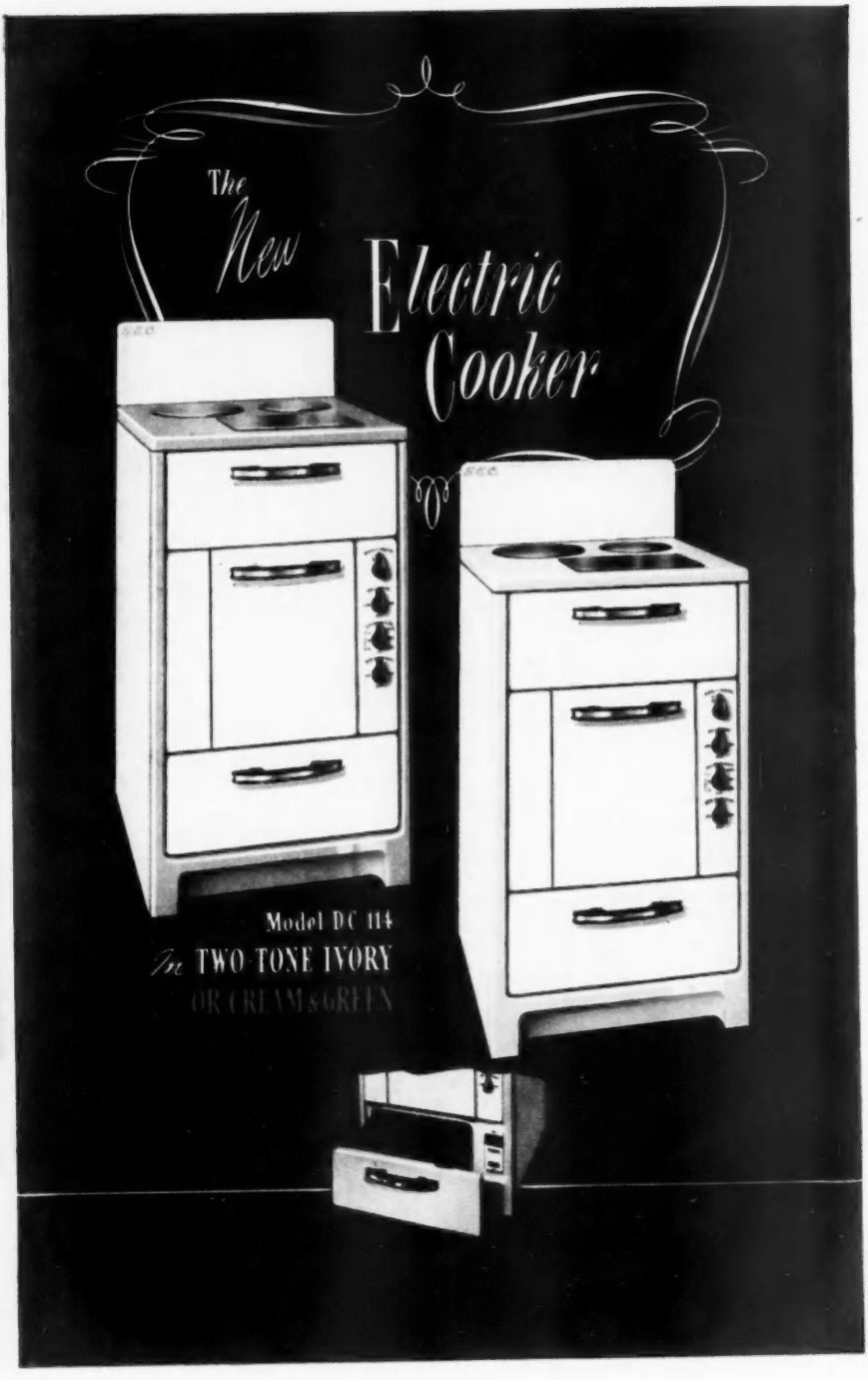
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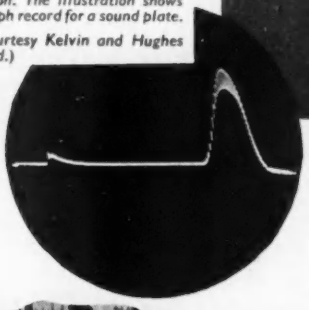
BELOW:
Thick pla es for fabrication into boiler drums or other Class I welded pressure vessels are subjected by Babcock & Wilcox, Ltd. to ultrasonic test, when received from the mills, before bending and fabrication.

Ultrasonic waves projected into the plate are reflected from the opposite wall and from internal flaws should these exist, the reflections being indicated on an oscillograph. The illustration shows the oscillograph record for a sound plate.

(Photo by courtesy Kelvin and Hughes Industrial, Ltd.)

An echo of the FUTURE



BABCOCK & WILCOX, LTD. use the ultrasonic method of testing thick boiler plates to confirm their freedom from lamellar or other flaws, before they are fabricated into high pressure boiler drums. With this method, a flaw is revealed, through the medium of an oscillograph, by an echo from a beam of ultrasonic waves—an echo which, by ensuring the rejection of unsound material at an early stage, helps to safeguard the future performance of Babcock high pressure boilers.

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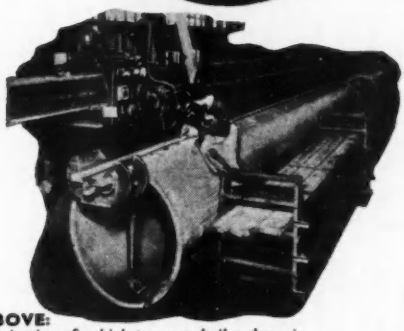
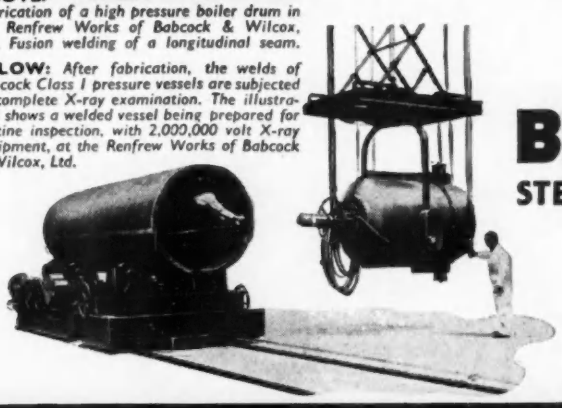


ABOVE:
Fabrication of a high pressure boiler drum in the Renfrew Works of Babcock & Wilcox, Ltd. Fusion welding of a longitudinal seam.

BELOW: *After fabrication, the welds of Babcock Class I pressure vessels are subjected to complete X-ray examination. The illustration shows a welded vessel being prepared for routine inspection, with 2,000,000 volt X-ray equipment, at the Renfrew Works of Babcock & Wilcox, Ltd.*



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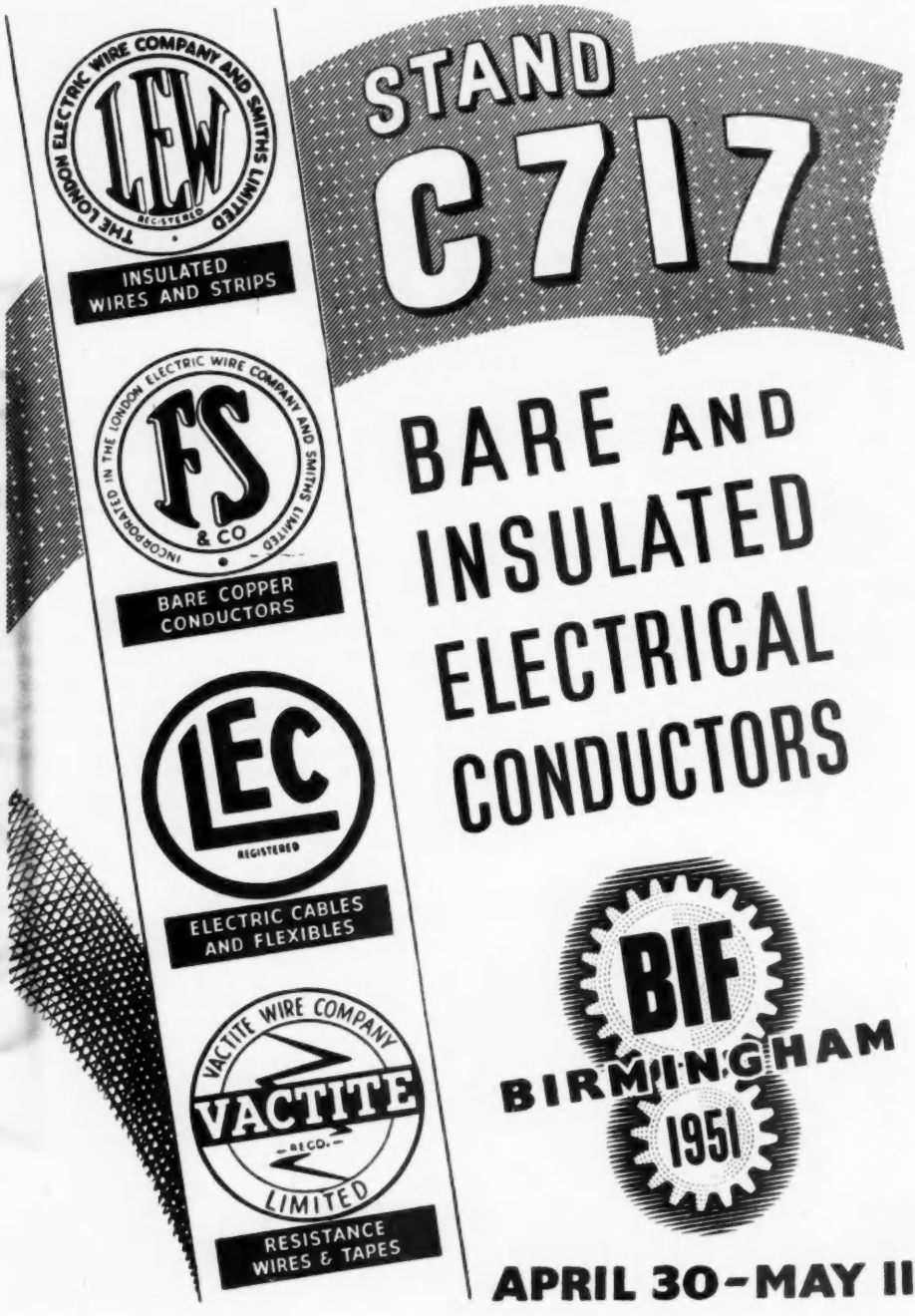
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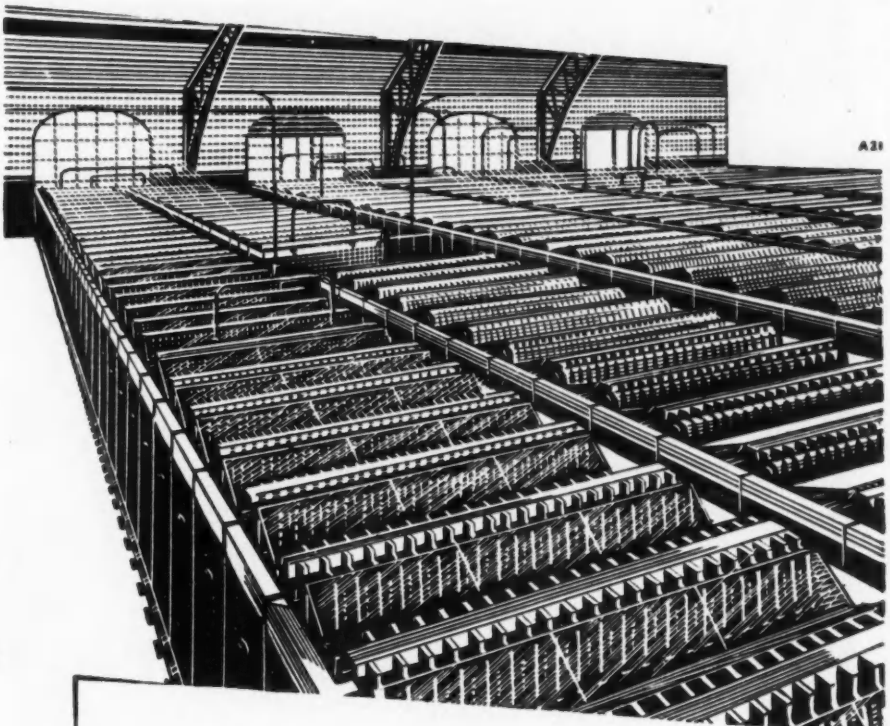

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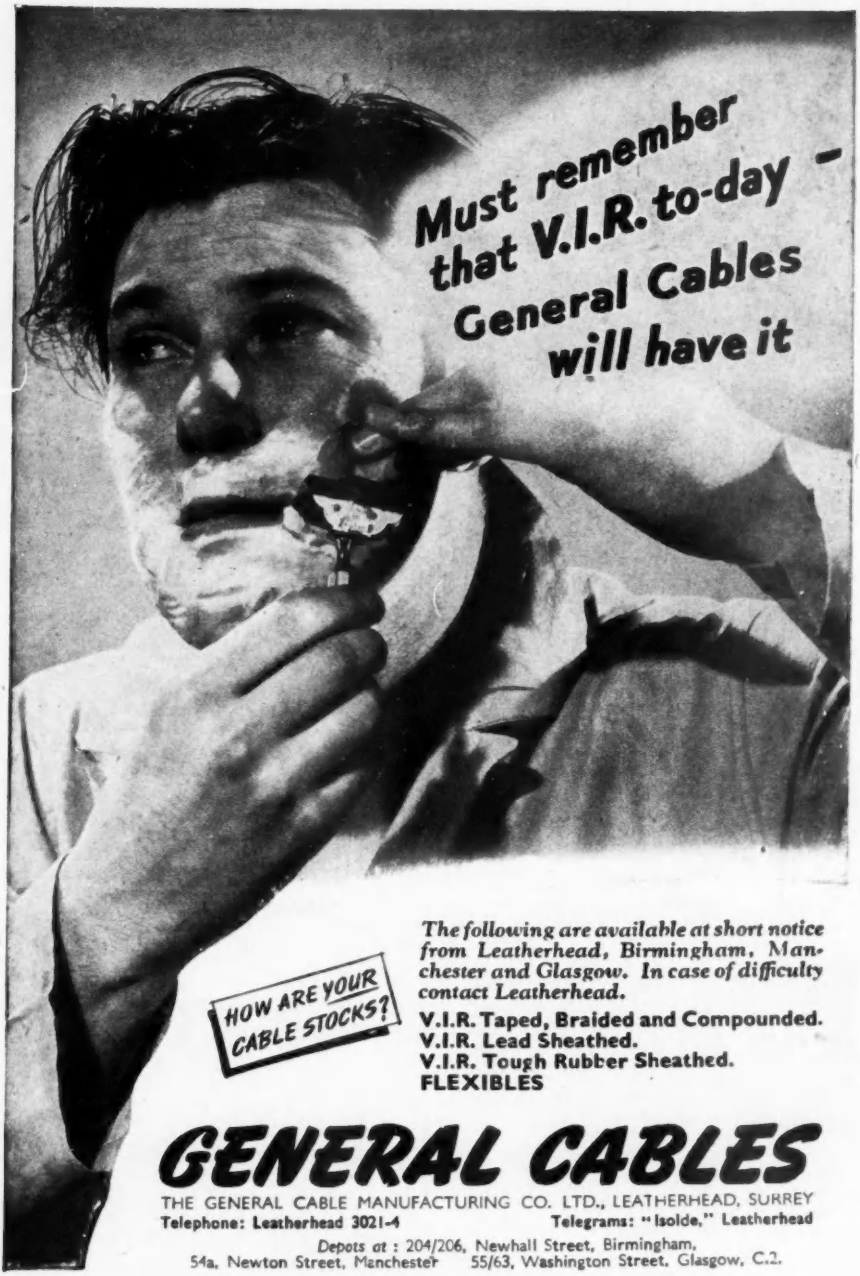

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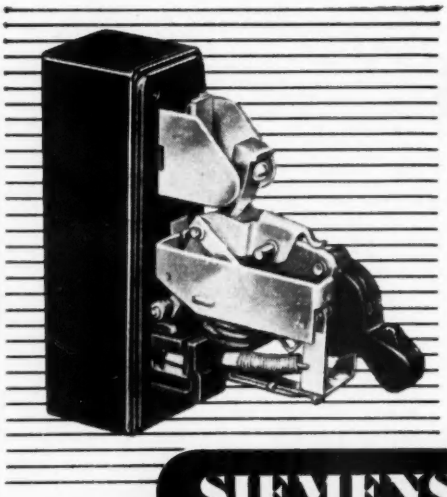

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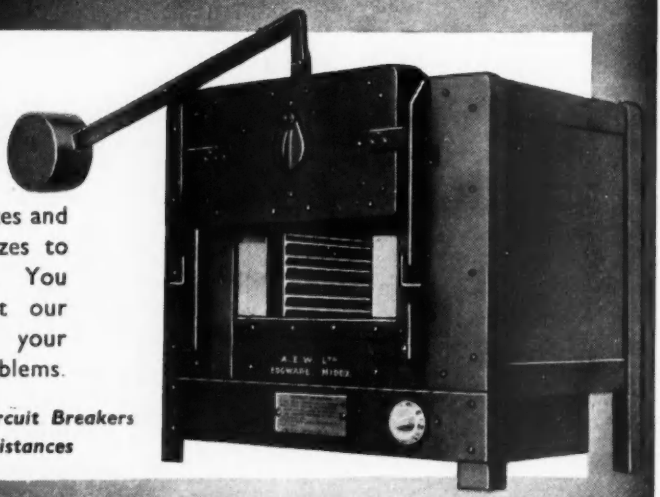

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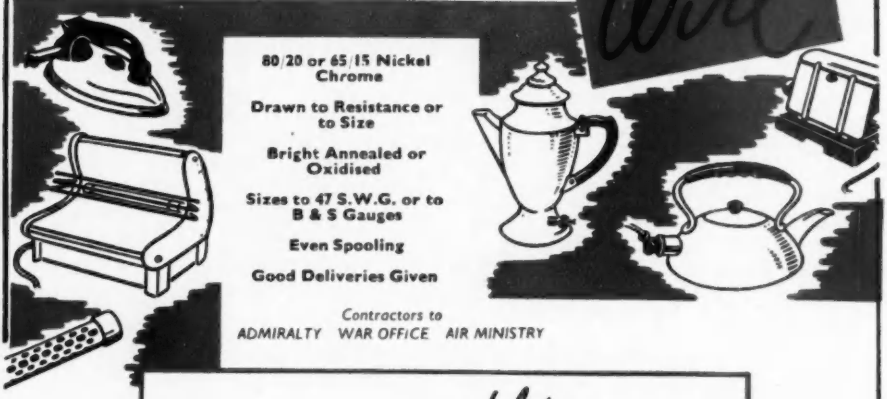

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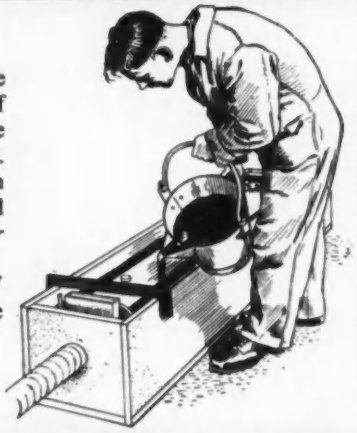

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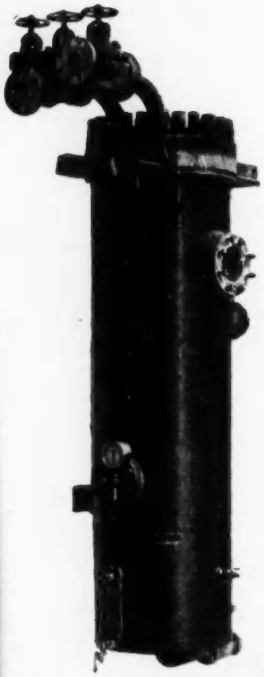

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A 2011 **Finish:** Black and White Vitreous Enamel. **Overall Dimensions:** Height 7¾ in., depth (back to front, excluding grill door handle), 11½ in., width 25 in. **Grill Chamber:** Height 5⅛ in., depth 10¾ in., width 18¼ in. Grill Boiling Plate 10¾ in. x 8 in., 2,000 watts. Solid boiling plate 6¼ in. diameter, 1,000 watts. Voltage range 200-210, 220-230, 240-250.

A 2010 **Finish:** Black and White Vitreous Enamel. **Overall Dimensions:** Height 7¾ in., depth (back to front, excluding grill door handle), 11½ in., width 18¼ in. **Grill Chamber:** Height 5⅛ in., depth 10¾ in., width 12 in. Grill Boiling Plate, 10¾ in. x 8 in., 2,000 watts. Voltage Range 200-210, 220-230, 240-250.

THE soaring demand for "XCEL" Table Cookers is directly attributable to accommodation difficulties. Their compact design and excellent black and white all-vitreous enamel finish, in keeping with the highest "XCEL" traditions, appeal to all who live in flats and small houses.

Both models incorporate a dual-purpose grill-boiling plate, and are supplied complete with polished aluminium deflector plate and vitreous enamel grill pan and grid.

Heat-insulated feet, pilot light indicator and three-heat switch control are standard fittings, with a simmering device as an optional extra. Radiant boiling plates can be fitted to Model No. A2011.

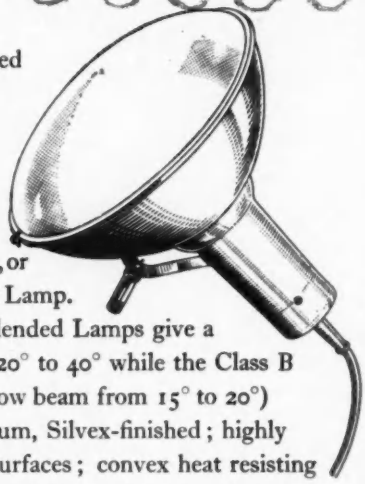
Share the benefit of the latest "XCEL" success. Place "Table Cookers" at the head of your order list.

Write for complete details

ELEXCEL LTD., Victor Works, Broadgreen, Liverpool 14

Telephone: Childwall 2201 (5 lines Telegrams: "Xcel, Liverpool"

the fiesta flood



A floodlight specially designed for celebrations and jollifications during the Festival year. The Fiesta-Flood will take a 300–500 watt General Service lamp, a 500 watt Class B2 Projector Lamp, or a 250 watt MBT/U Blended Lamp. (The General Service and Blended Lamps give a medium beam spread from 20° to 40° while the Class B Projector Lamp gives a narrow beam from 15° to 20°)

CONSTRUCTION: Aluminium, Silvex-finished; highly specular internal reflecting surfaces; convex heat resisting cover glass sealed to body by rubber gasket; two feet of three core T.R.S. cable; ¾" E.T. male thread conduit stem mounting

PRICE 82/6 *Cover Glasses* Red, green, blue and amber available 6/- extra

made for the occasion

by the house of Simplex

Simplex Electric Company Limited
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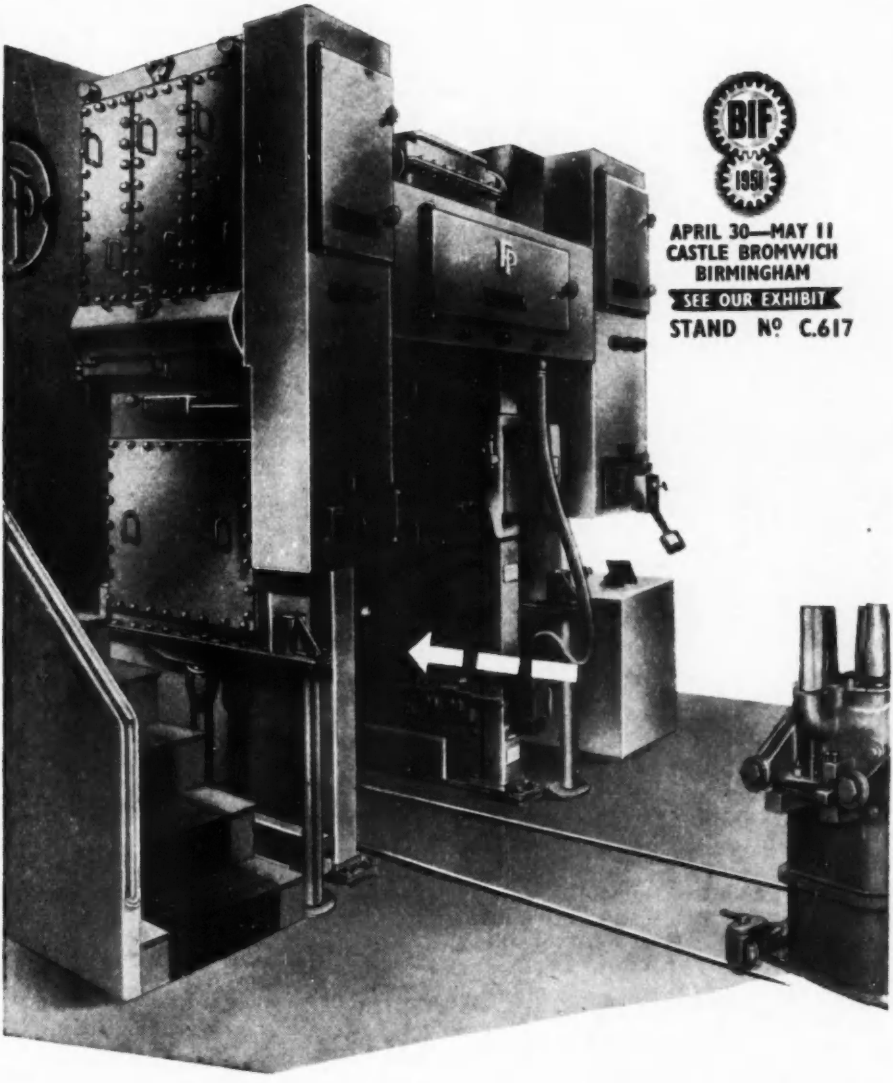

BIF 1951

APRIL 30—MAY 11
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SEE OUR EXHIBIT

STAND Nº C.617

We flatter ourselves on the rather ingenious entrance to the office on our Stand at this year's B.I.F. This consists of a tunnel through the principal exhibit, the 'Ferguson Pailin' VSLP10/1VS ring main equipment for 33 kV service. The effect, contrived solely for exhibition purposes, is as novel as are many of the features incorporated in the design of the unit which have made possible a greater degree of standardisation of substation equipment than ever before.

Other items of interest are our VTBP4 switch unit for 11 kV, 400/800 amps service, and a multi-circuit control panel which achieves the minimum in compactness of layout of control switches and indicating instruments.

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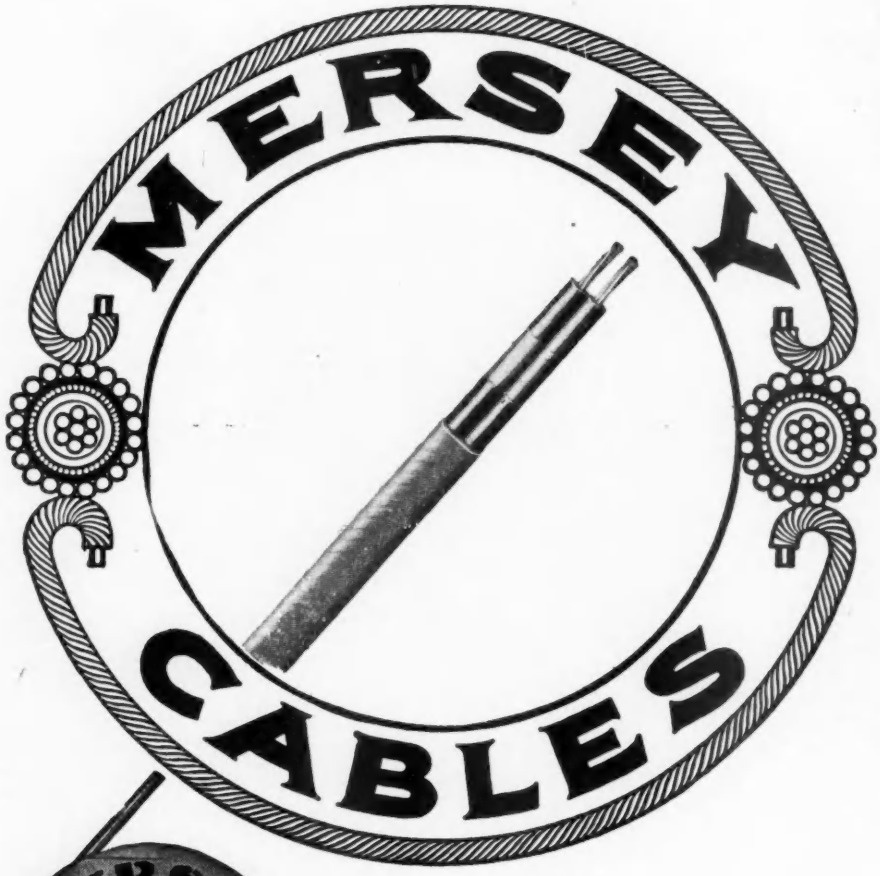

All Sizes of rubber insulated wires, cables and flexibles are made under the famous MERSEY name. *Illustrated is a* 3/.036 *Flat Twin V.I.R Insulated, Taped, Varnished Cambric Lapped, Braided and Red Lead Weather resisting Compounded H.S.O.S. Cable* 250 *volt Grade. To B.S.—No.* 7/1946.

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mercury-arc rectifiers

3,000 v. Pumpless Rectifiers in Traction Service

Electrification of the Brazilian Estrada de Ferro Santos a Jundiai was completed by 'English Electric' in 1950. Fifteen 3,000 h.p. 3,000 volts DC electric locomotives, the most powerful of their type yet built in Britain, three 3-car suburban trains, and all AC supply, transmission, signalling, converting and control equipment — including substation buildings — were supplied by the Company.

In this typical substation at Tiete, power is fed to the overhead conductors by two air-cooled, sealed steel-tank mercury-arc rectifier sets each rated 2,000 kW at 3,000 volts. Ultimate total capacity of the substations is 18,000 kW, of which 12,000 kW is installed, soon to be increased by a third 2,000 kW set at Tiete to meet increased traffic demands. This is believed to represent the first application of pumpless air-cooled steel-tank rectifiers for main line traction duty at 3,000 volts.

'English Electric' rectifier equipments in service range from the 36 kW unit for Istanbul University to a 27,810 kW installation for aluminium production, largest ever supplied by a British manufacturer.

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Rectifier Substation Department : Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

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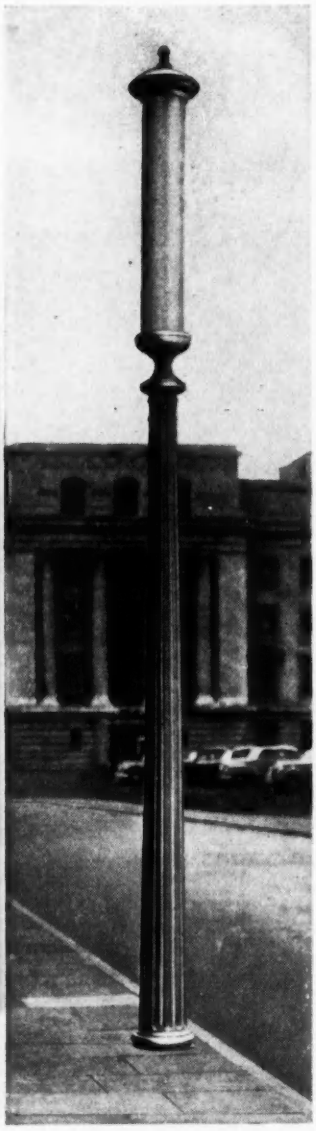
THE Revo Electric Co., Ltd., are proud to be associated with the new street lighting scheme which has been installed in the city of Birmingham.

The fittings and columns themselves present a feature of architectural beauty, adding grace and dignity to the thoroughfare by day, and providing most effective illumination by night.

The fluted columns are of cast-iron; and the lantern, which accommodates four 80 W 5 ft. fluorescent tubular lamps, comprises cast aluminium canopy, finial and base, with a cylindrical enclosing member of opal Perspex.



(Above) *The column and lantern by day*

★

(*Right*) *Bull Street*

★ ★ ★ ★

street lighting history . . .

Colmore Row

Total height from the Ground to the top of the lantern is approximately 21 ft.

The principal officials responsible for this scheme include: the City Engineer and Surveyor, Mr. Herbert J. Manzoni, C.B.E., the City Architect, Mr. D. H. Davies, F.R.I.B.A., and Mr. A. V. Blake, M.I.Mech.E., of the Public Lighting Department.

The whole of the equipment was manufactured by the Revo Electric Co., Ltd.

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STREET LIGHTING EQUIPMENT

REVO ELECTRIC CO. LTD., TIPTON, STAFFS.

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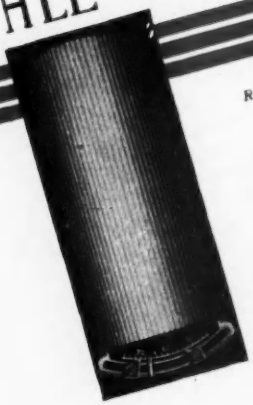
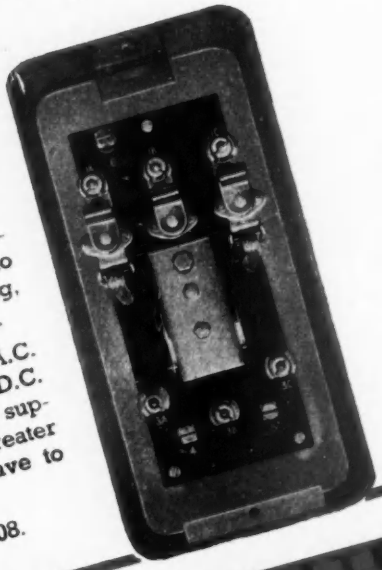
FOR ALL CONTROL SCHEMES



Room thermostat type "Q" capacity 15 amps A.C.



Interior view, Triple-pole Contactor type R.A.3 rated 30 amps per pole.

The "SATCHWELL" room thermostat type "Q" is particularly suited to the control of electric Space Heating, to provide comfort and economy.

Single, double and triple-pole A.C. Contactors type "RA" and D.C. Contactors type "RD" can be supplied for use where loads greater than the thermostat rating have to be switched.

Send for lists 100 and 108.

THE RHEOSTATIC CO. LTD.
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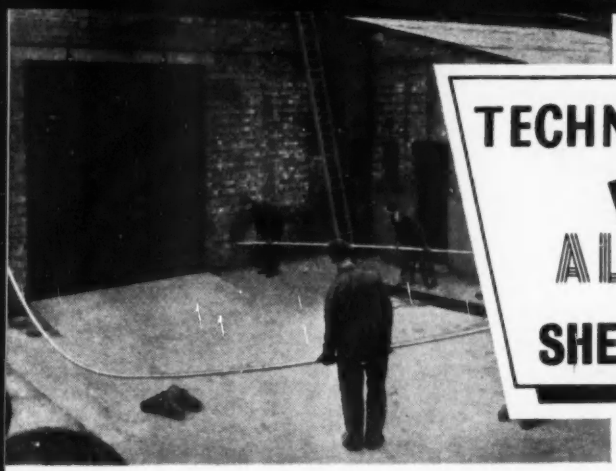

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ALUMINIUM SHEATHED CABLES

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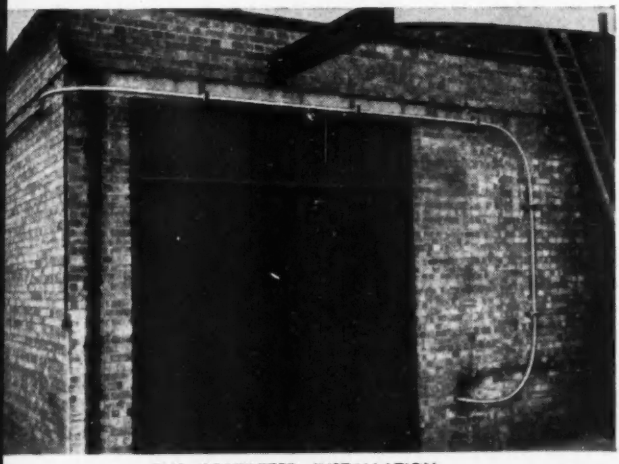
STRAIGHTENING THE CABLE AFTER CLEATING IN POSITION.



THE COMPLETED INSTALLATION.

J. & P. Aluminium Sheathed Cables offer very great technical, as well as economic, advantages for surface installations. The strength of the sheath and its resistance to atmospheric corrosion enable cables to be installed bare and unarmoured, and the reduction in weight permits fewer and lighter fixings to be used.

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Supporting fittings may be wood (aluminium is immune from attack by wood acids) or porcelain, galvanised iron or aluminium; and, as spacing is not critical, the same support centres can be used for a number of cables of widely differing sizes.

A turning Point in Cable Engineering

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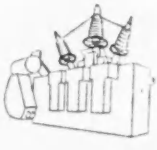
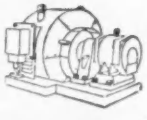
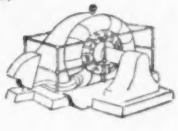




"FOR US IT IS AN ESSENTIAL SERVICE . . . ." says the power engineer



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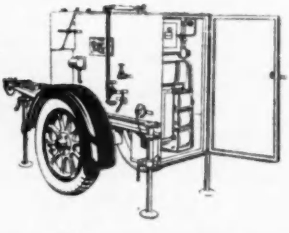

STREAM-LINE FILTERS LTD
HELE-SHAW WORKS · INGATE PLACE · LONDON · S.W.8

FOSTER

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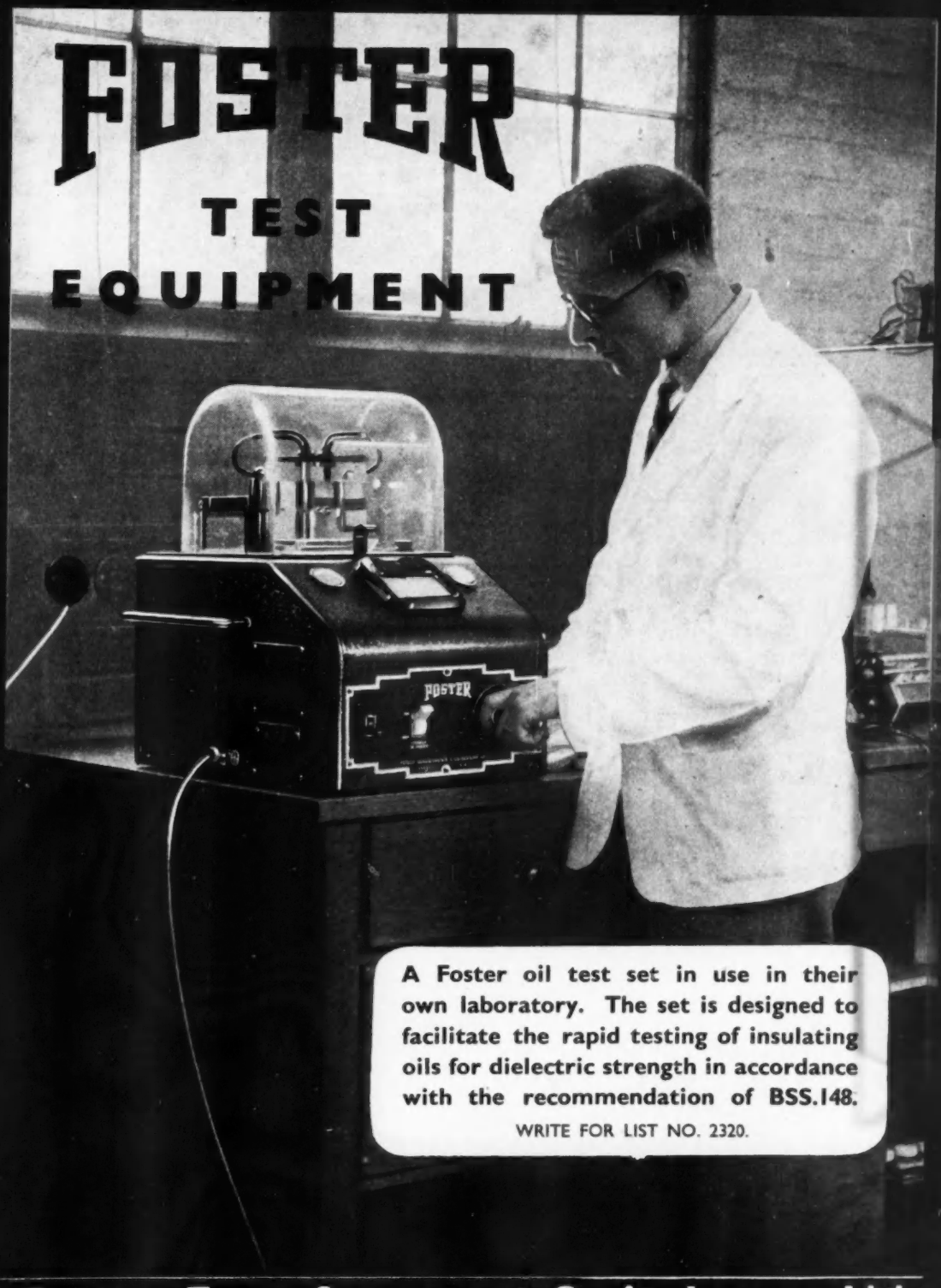

A Foster oil test set in use in their own laboratory. The set is designed to facilitate the rapid testing of insulating oils for dielectric strength in accordance with the recommendation of BSS.148.

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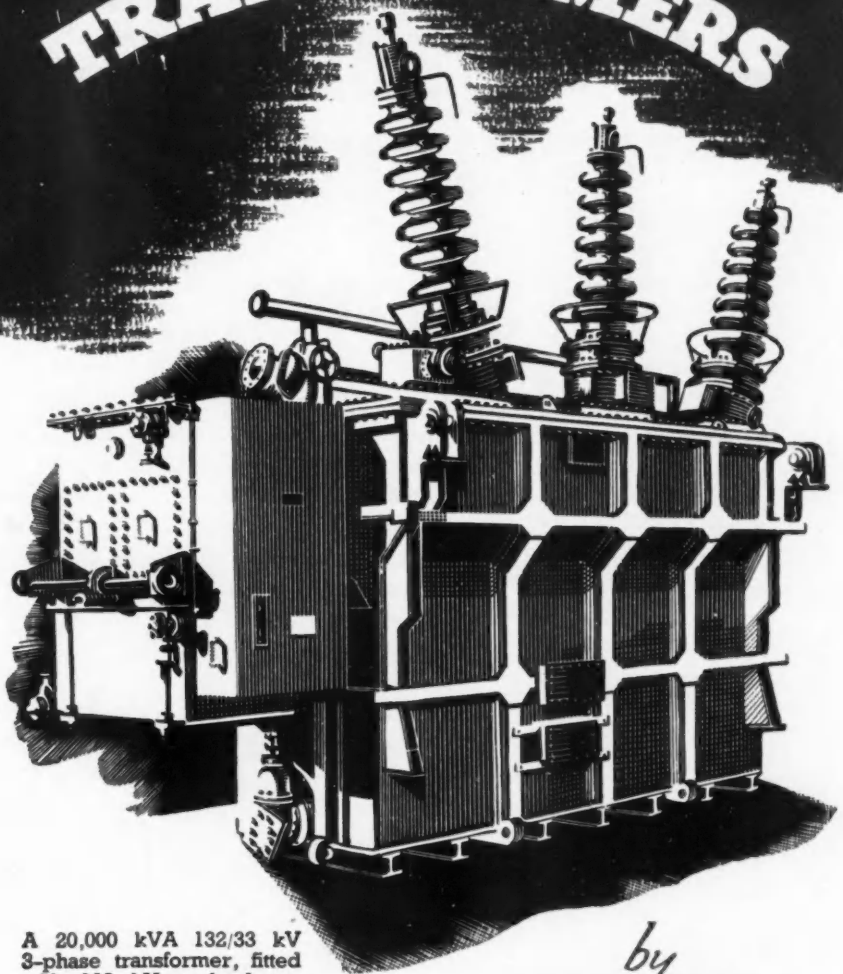
TRANSFORMERS



A 20,000 kVA 132/33 kV 3-phase transformer, fitted with 132 kV on-load tap changer, as supplied to the B.E.A.

by G.E.C.

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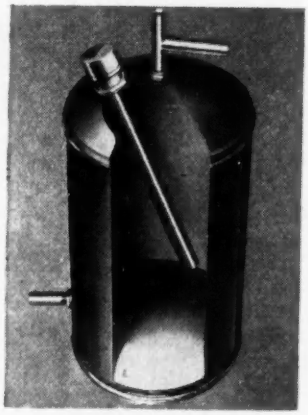

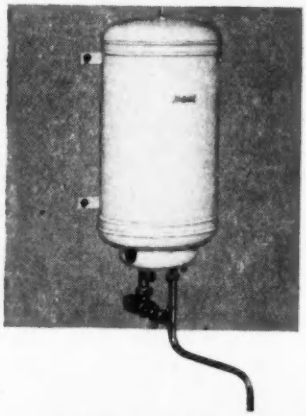

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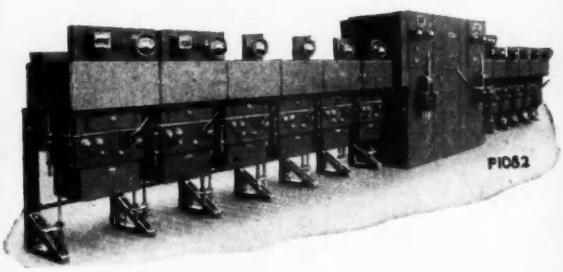

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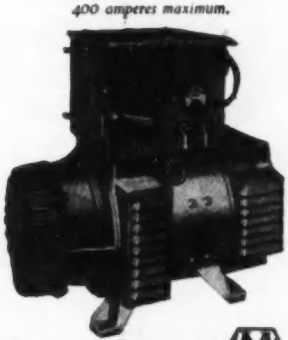
The Metrovick "Parodyne" Arc Welding Set is available in two sizes—300 amperes or 400 amperes maximum.



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METROVICK *Equipment for More Efficient Welding*

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In other words the B.N.E. is a cooker that needs little sales talk . . . have one in **your** showroom and give your customers the satisfaction of having the best.

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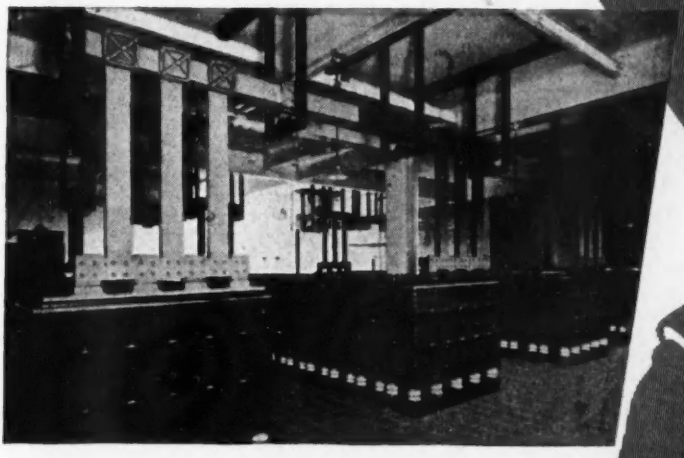

These batteries in the Museum Telephone Exchange, London, are typical of many P & G batteries installed throughout the country to maintain telephone efficiency. Our 60 years' experience in the battery business covers a vast and varied field; including batteries for generating stations, railway electrification work and emergency lighting systems. P & G 3 point service working on the sound principle of two heads being better than one, exists to provide: 1. *Detailed specifications or an impartial second opinion on any scheme.* 2. *Complete equipment and installation.* 3. *Regular inspection and report.*

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"Ellison" electric switchgear is safe—even in the hands of a "rough" operator. The cases, contacts and mechanism are designed for hard work. If the duty demands abnormally frequent operation, or if the situation is of unusual severity an "Ellison" circuit breaker or motor starter will stand up to the job.

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SEND FOR DESCRIPTIVE LITERATURE

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ELECTRICAL TIMES

Vol. 119 No. 3102 THURSDAY 19 APRIL, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

Festival Wiring	637
Festival Distribution	641
Optical Projection in Schools	643
Problems of the Manufacturer	644
Notes on Wiring, *by Megohm*	645
The Magicon, Part II, *by J. Griffin*, A.M.I.E.E.	646
Problems and Practice in Engineering	649
Seventy Years of Distribution	651
Faraday Shields Go North Again	652
The Plant Shortage and Load Control	653
Overseas News	654
Personalities in the Industry	656
Industry and the "Supers"	658
Electricity Supply Prospects	659
New Literature	660
Power Supply in March	661
New Methods in Electric Welding	662
Wired Television at Margate	662
The Buyer's Column	663
"Twenty Questions" in the Showroom	664
The Week in News	665
Questions in Parliament	669
Electric Supply News	670
Company Activities	671
Commercial Information	672
Classified Advertisements	49
Index to Advertisers	58

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Editorial

BUDGET HITS THE UNIT

OF all the Budget proposals, that to remove the initial allowance for plant and machinery seems likely to affect the financial position of the British Electricity Authority most seriously. Hitherto, because of the operation of this allowance, coupled with constant and heavy expenditure on new plant, "Nil" has appeared against the item "income tax and profits tax" in both the annual revenue accounts so far published by the Authority. For reasons connected with the technicalities of revenue law, some liability to profits tax was expected to mature for 1950-51, but on account of the 40% allowance on machinery and plant and 10% for buildings, there was no prospective taxation for future years. With the discontinuing of these allowances, it seems that tax of the order of £10 millions will fall due, and this will appear on the debit side of the consolidated revenue account, since the Area Boards and the central authority are assessed as one. The report year 1953-54 will be the first affected by the new tax position, and the burden will bear most heavily in that year. Particularly is this so since the B.E.A. has no taxation reserve to spread the effect of the initial allowances over the life of the plant. It would be financially prudent for the Authority to reverse this decision and commence by setting aside a suitable sum in the accounts for the year 1950-51.

TAX ON APPLIANCES

LAST week Meteor wrote of the part electricity has to play in reducing domestic drudgery; this week the subject is the part the Chancellor of the Exchequer is playing in promoting it. That is the only interpretation of the doubling of the purchase tax on electrical appliances. What strange reading the list of tax changes makes! Washtubs and hand wringers have been freed from tax, while electric washers now carry double; cleaning materials have been exempted, but the tax on vacuum cleaners has been raised to 66⅔%. Why should these appliances be singled out in this way? Does the former Minister of Fuel hope to limit electricity consumption thereby, or is it considered that the limitation on raw materials for such products is inadequate to prevent interference with the defence programme, and that the present restriction is necessary to provide controls at both ends? It appears to have been overlooked that married women are being encouraged to continue in work; indeed, the present income tax allowances are designed for this purpose, but such a policy is quite inconsistent with prohibitive taxation on labour-saving devices in the home. True, these higher taxes might have been more widespread on electrical goods than the present list, but that is a poor sort of consolation. It is one which will be rejected by manufacturers and users alike.

BAD BALANCE

TROUBLE lies ahead for the B.E.A. when the annual report for 1950-51 appears later this year. In spite of the much publicised push to install more generating plant, the rated capacity of turbo-alternators installed will appear as only 899 MW, against last year's 1,005. In part this is a trick of the calendar, since 245 MW were installed during March, 1950, as against a mere 20 MW for that month this year; but it is improbable that the lay public will appreciate this subtlety. The low figure is particularly unfortunate since it gives a false impression of the true position. There has been a steady increase in the rate of commissioning plant, so that the effective net increase in installed capacity in a given twelve months has risen from 675 MW for the period ending January, 1950, to 1,051 for that ending February, 1951. The corresponding figure for the year ending March, 1950 was 907 MW, and now, for March, 1951, 797 MW. (The difference from 899 MW is accounted for

by sets removed and downrated.) Minor consolation lies in the better showing that will be made by the figures for boilers, and in the resulting overall improvement in output capacity. The supply position here has become better to such an extent that 20% more steam-raising plant was brought into operation in 1950-51 than in 1949-50—the total evaporative capacity of the new boilers adds up to nearly 11,000 klb/hr. The fact remains that it is the generating sets that will attract attention, and a Parliament that disliked advertisement of their erection is likely to resent even more their apparent scarcity. Worse still, by the time the report is published, shortages of metal, both steel and non-ferrous, will have begun to affect the rate of installation adversely, as Lord Citrine pointed out last week.

NOT SO OBVIOUS

ELECTRICITY will play an outstanding part in all the exhibitions arranged for the forthcoming Festival of Britain celebrations, and the art of the lighting engineer, the ingenuity of the fittings designer and the skill of the plant manufacturer will be made apparent to all visitors. The equally important everyday work of the contractor and the installations and mains engineers will be less obvious, but these sections of the industry have their own special spot—the Exhibition of Live Architecture. Unlike most sections of the Festival this has a permanent purpose, for the houses, flats and public buildings on the Lansbury site at Poplar, which forms the exhibition, are part of a comprehensive plan for the rebuilding of that much-bombed London borough. There, as in modern rehousing schemes throughout the country, electricity is being used in many ways to make living easier, and for the engineers amongst this summer's visitors to London, we describe this week the installation methods and distribution details standard in this part of the metropolis. They will not stand out to the casual visitor to the Lansbury estate, but they are of primary importance in ensuring that a reliable supply of electric power in the home, regarded by all town dwellers today as theirs by right, is secured at an economical cos..

SOUND FOUNDATIONS

IT was at one time fashionable for the mechanical engineer to regard the "electrician" as an inferior offshoot of his own profession—an engineer who had taken the wrong turning, so to speak; just as today, members of the mechanical engineering profession may in festive mood be called "plumbers." Each convinced that their own branch is superior, the absolute interdependence of the two categories frequently tends to be overlooked. A recent visit to the Hunter-Hazell collection of historic cables came as a timely reminder of the debt which the pioneers of transmission owed to the mechanical engineer. The cable designer as such did not exist in those days; the electrolytic model for stress studies, and the theory of voids in dielectrics were yet unborn, the designer's chief worry being to produce something which could be buried without letting water in. Those who examine the original Edison joints with their ingenious swivelling glands and their remarkable similarity to present-day cable boxes, can appreciate how well the mechanical engineer rose to the occasion when the foundations of the cable industry were laid.

ELECTRELEPHANT'S CHILD

THE distinguishing feature of Kipling's Elephant's Child, was a "'satiable curtiousity," and he could never refrain from asking questions. Tiresome as this technique may be, at times, it is hard to beat as a method of obtaining information, and deserves fostering. Particularly so in the case of the younger generation in our showrooms, where to know all the answers is a very large part of the job. Elsewhere in this issue we review the application of the "quiz" technique to this end. Its originator, Miss Gladys Burlton, is no newcomer in the field of salesmanship training, as far back as 1936, Meteor summed up her methods with the comment, "Miss Socrates knows all the answers." If full advantage is taken of the popularity of the "quiz," the aspiring showroom assistant can outstrip even the Elephant's Child.

Meteor

Electricity is a powerful weapon for making everyday living more pleasant and more efficient. As such, it will feature in the South Bank Exhibition of the Festival of Britain. Less easily seen, but of more continuing importance, is the part it plays in the 28-acre Lansbury Estate, in Poplar, which has been selected as the Festival Exhibition of Live Architecture. Though only one of many carefully planned rehousing schemes being developed in London, this project has an enhanced interest for engineers because of its association with the Festival. A description of its electrical features is given below, for engineers visiting the exhibition during this summer

FESTIVAL *Wiring*

Flats on Lansbury estate make good use of ring main

OF the 405 dwellings being erected in the Lansbury scheme, all but 49 are flats. These are built in blocks of from 6 to 36, up to six storeys high, and are provided with rising mains to feed the individual flats on the various floors.

Some of the electrical equipment installed in a typical flat is shown in the illustrations accompanying this article. The area board's main fuse is placed in a sealed distribution chamber in the run of the rising main, and the installation in a flat commences with the meter chamber and the consumer's control unit (Fig. 2), which is of the type standardised for all L.C.C. post-war housing. It consists of a steel cupboard 13½ in. by 24 in. by 5 in. deep, which is built into a recessed section of the wall in the entrance hall of the flat. The main switch is a 60-amp Wylex microgap type, and fuse way facilities include two 30-amp ways, three 15-amp (one spare) and one 5-amp way for the lighting circuit. Rewirable type semi-enclosed fuses are used.

The flats in the block illustrated in the accompanying photographs (Fig. 1) have one living-room, three bedrooms, a fair-sized kitchen, and separate bathroom and w.c. All the rooms and the entrance hall are provided with one ceiling lighting point controlled by a G.E.C. Mutac switch, with the exception of the bathroom. Here a cord-operated ceiling switch is provided to meet the requirements of I.E.E. Regulation 1002(D); 3 kW socket-outlets, wired on the ring main scheme, are installed on an ample scale, there being three in the living-room, two (effectively) in each main bedroom, and one in the small bedroom. The reason for "effectively" is that, in the principal bedroom, there is a 2 kW panel fire permanently connected to the ring main in lieu of one socket-outlet. This fire is controlled by a unit consisting of a 13-amp fuse, as required by I.E.E. Regulation 201(D), and a switch. A further 13-amp socket-outlet in the kitchen also has a switch controlling it, and is fed from one of the 15-amp ways.

Attention has been given to the convenience in use of the socket-outlets, and instead of being mounted at floor level, they are placed some 18 in. higher. An exception is that provided in the kitchen, which is fixed 4ft 9 in. above floor level, and is placed near the draining board. For safety, all socket-outlets

Fig. 1. Building progress at the west end of the Lansbury estate

are of the shutter protected type, with operation of the shutter by the earth pin of the plug.

Although full freedom of choice is permitted as regards method of cooking, conduit is run to allow for the fixing of an electric cooker, and a cooker control unit is provided as part of the standard electrical installation. It is found that tenants are about equally divided in their choice of electricity or gas for cooking. Another step towards making the home all-electric when this suits the tenant is the provision of a thermostatically controlled 2 kW immersion heater in the hot-water storage tank. The standard water heating arrangements also include a back-of-the-fire boiler in connection with an open fire in the living-room.

Communal Supplies

Communal laundries are provided in many of the blocks of flats. These consist of a washing-room with hot water supply, an electric wash boiler and an automatic Bendix washing machine, with a gas-heated cabinet for final drying of the clothes. The tenants use the laundry in accordance with a mutually agreed rota, and the installations are of special interest because of the system in operation to ensure that the electrical load is essentially off-peak in character.

The hot-water cylinder is a storage type with 125-gallon capacity, and is powered by a 6 kW three-phase electric heater. Water supply to the cylinder is arranged for gravity feed, and is controlled by an electro-magnetically operated valve. A time-switch actuates the valve and also controls a contactor on the circuit to the heating elements, the timing mechanism of this switch being set so that only during the night and evening can the heaters be switched into circuit, and cold water be fed into the cylinder. For the rest of the day the cylinder is merely a storage tank and source of a limited amount of hot water. This avoidance of peak demand times explains the use of gas for heating the clothes drier. This use of electrical power at a time of relatively low general demand is, of course, popular with the electricity boards, and a special tariff is granted for units used for this purpose.

Only four blocks of flats on the Lansbury estate are provided with lifts. Where these are installed, they are of eight-person size, with fully automatic passenger control. The motor room is placed at the top of the shaft, and a 6 h.p. three-phase induction motor is used to drive the lift at 100 ft/min via a belt drive on to the worm shaft (Fig. 5). An inductor circuit is used for registering and obtaining floor level.

Lighting and Wiring

Public lighting is provided in many of the flats on stairways and above lateral corridors. Where it exists, time control is applied, and Holophane prismatic type fittings are used, but in many cases careful co-operation with the local authority and the electricity board has enabled economy to be effected by the siting of street lighting to provide the illumination needed for the flat entrances.

The contractor wiring any given block of

Fig. 2. On the right is a consumer's unit of the type standard for L.C.C. flats, the neat fuseboard being specially notable. Public lighting for the flats is controlled from the neatly arranged time-switch and fuse equipment seen below

flats has to deal with the intake room, the laundry, public lighting, the flat installations and the conduit system for the lateral mains. The electricity board supplies all the copper up to the consumer's main switch, and becomes responsible for maintaining it. Most of the conduit used in the wiring of individual flats is $\frac{5}{8}$ in. welded light gauge, provided with lug grip connections. A normal black enamel finish is used, any damage caused to this in erection being touched up with red lead paint. An exception to the use of light gauge conduit occurs in the cooker circuit, this being run in 1 in. diameter heavy gauge screwed conduit for reasons of mechanical strength and to ensure that the replacement of cables if necessary in the future will be easy, bearing in mind the route to the cooker control unit from the distribution board.

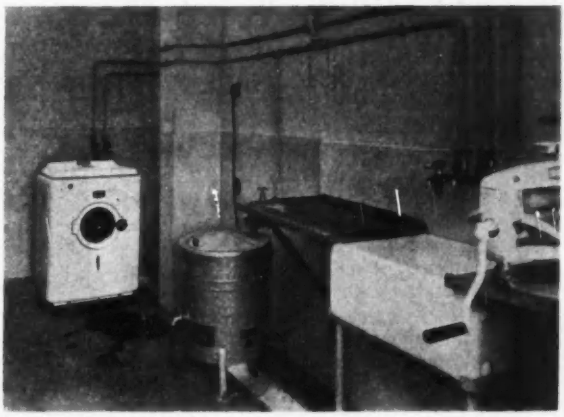


Fig. 3. Electric washing machines and boilers are a feature of the communal laundries, one of which is shown in this illustration

Lug Grip Reliable

It is interesting to note that the L.C.C. electrical department finds as a matter of experience that rather better continuity is obtained with lug grip fittings, when light gauge brazed or welded conduit is used, than with screwed type joints. Provided that the electrician makes a satisfactory joint to start with (and this will be shown upon the initial test) there is little subsequent deterioration. Tests taken for many years after installation have amply proved this point. This is believed to be due to realisation by the electrician that special care is necessary in installing light gauge conduit if satisfactory results are to be obtained. The continuity is found to be either very good or hopeless—seldom in-between. If the resistance to the earth connection exceeds 0·5 ohm at the time of test, it is almost certain to have deteriorated by the end of the six months' maintenance period.

All wiring is arranged for the looping system and no tee-joints are permitted. All socket-outlets are taken from the floor of the flat above, and in the case of reinforced concrete buildings, the conduit is laid down in its appropriate position on the shuttering before the screed is run. If possible, a drop is then taken to the first socket-outlet, and the conduit continued in a chase around the walls of the room at the 18 in. height to save further drops. The reason for feeding down to circuits is the avoidance of condensation troubles which may be experienced if U-tubes of conduit are formed with outlets in warm rooms above the level of the horizontal part of the U.

One special difficulty is now being noticed with the development of more economical methods of building design. Architects are tending to regard the screeding as part of the load bearing structure, a practice that results in its critical design, and in a decrease in thickness. As a result, they insist on the conduit and other tubing being run only in the neutral axis of the floor. From the electrical contractor's point of view, this means that in installing his conduit before the screed is poured, he must place it on pedestals an inch or two high. This is, of course, enough trouble in itself, but extra difficulty is introduced by the problem of supporting it adequately in between pedestals, and of keeping it safe against the attack of building workers' boots. When hollow pots are involved in the floor construction, this neutral axis requirement introduces further complication, since diagonal runs of conduit are not possible, and the length of run has to be increased and more bends introduced to keep tubing in a direction in line with or at right angles to the run of the pots.

Cooker Units

The cooker conduit run has already been mentioned as an exception to the general rule in the matter of size. It stands out, too, in respect of its termination. The main run of conduit ends in a 9 in. by 3 in. by 2 in. box for the cooker control unit, but from this is run a short length of 1 in. conduit recessed in the wall and terminating in an elbow and

brass bush 1 ft 9 in. above floor level. This takes the t.r.s. flexible lead to the cooker.

Cable of 250 V grade v.r.i. is used for the wiring of all flat circuits, and is of 7/0·029 in. size, except in the case of the cooker circuit (7/0·036) and the lighting circuit (3/0·029). The connection between the panel fire control unit and the fire terminals, and between the water heater switch and the immersion heater and thermostat terminals, is 7/0·029 in. cable insulated with heat resisting rubber and asbestos braided. In running the ring main circuit, cognisance is taken of the fact that the socket-outlet by the living-room fireplace is likely to be the most heavily loaded. It is required that this should be connected approximately midway in the ring circuit, whenever this is possible.

Some of the cottages in the Lansbury scheme are of "traditional" brick and wood construction, but in general they are wired in a manner similar to that described above. This is a departure from the usual L.C.C. practice of wiring houses in t.r.s., and has been adopted so that electricians on the Lansbury site are concerned only with steel conduit.

Fig. 4. Fluted aluminium architraves and doors are used for the eight-person lifts, and are found to be easy to install as well as economical in first cost and in continuing maintenance charges

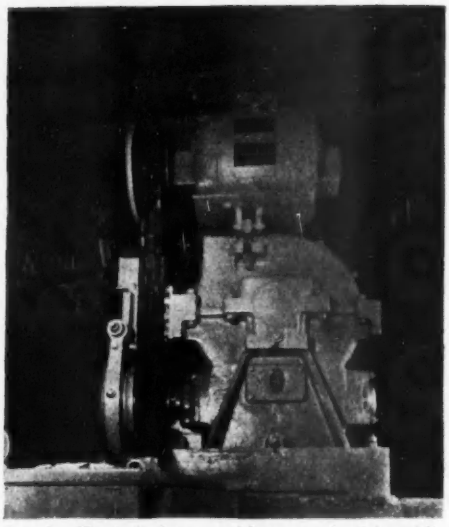


Fig. 5. The belt drive used between the 6 h.p. lift motors and the worm shaft is clearly shown here

In each flat, the conduit system is extended to a conduit box placed as close as possible to the rising water main, and a box is installed at this point. An earth connection is then made by means of a copper tape, held at one end by the screws securing the box lid and at the other by an earth clip fixed to the water main. All exposed metal work is bonded to the conduit system, and this includes metal sinks and draining-boards, which are connected to a conduit extension by 7/0·029 in. cable, a terminal being provided on the metalwork of the sinks for its connection.

In the case of panel fires, the framework is connected to the box containing the fire control unit through 7/0·029 asbestos braided cable.

Communal Wiring

Outside individual flats, the electrical contractor has to install the lateral mains (described elsewhere) and the laundry, lift and public lighting services. Heavy gauge screwed conduit is used in all these cases. Washing machines are wired in 3/0·036 in. v.r.i., while the 12 in. extractor fan for the laundry is supplied through 3/0·029 in. cables. Both are controlled by 5-amp switches. The previously described control gear for the public lighting and the storage type water heater is mounted on an angle-iron framework to one side of the intake chamber. The time-switches, main fuses, etc., are assembled in sheet steel cases and delivered to the contractor ready for fixing and wiring (as shown in Fig. 2).

Lift power supplies are taken from the electricity board's rising mains, and connected through a t.p. and n. switch and rewirable fuses to a circuit-breaker in the lift motor room. A separate circuit for lift lighting and emergency bell supplies is run in 7/0·029 v.r.i. from the public lighting control unit (Fig. 6). All communal service conduit systems are earthed to the rising water mains through ¾ in. by ⅛ in. copper tape.

In the case of the lift circuit breaker, an additional tinned copper earthing tape is taken to the rising water main in the roof tank room. Such water tank rooms are arranged adjacent to the lift motor rooms on appropriate blocks of flats.

FESTIVAL *Distribution*

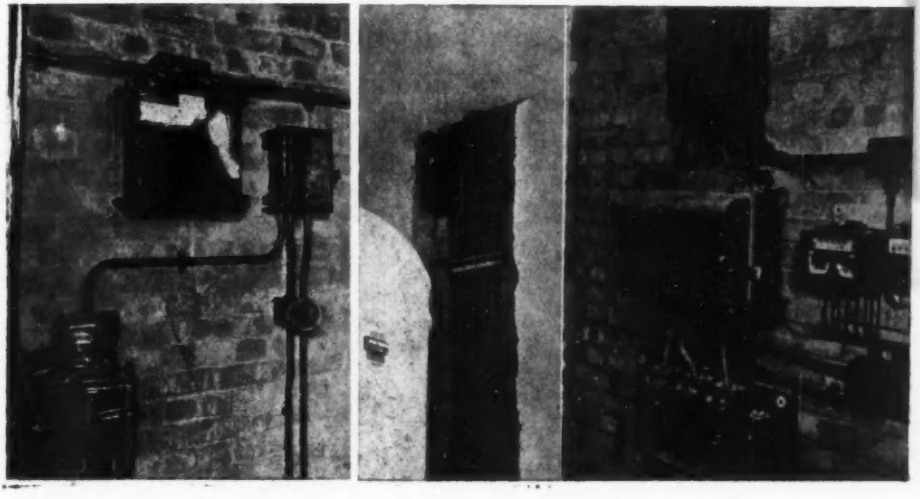
Distributed transformer system used at Poplar

DEVELOPMENT work is proceeding rapidly through the dockland boroughs of London, and the 28-acre Lansbury project is only one of many schemes claiming the close attention of the Northern Sub-Area of the London Electricity Board. The mains system adopted in the area, which is the distributed transformer scheme described by Mr. J. W. Leech, M.I.E.E., in an I.E.E. paper in 1941, lends itself readily to problems such as this newly laid-out residential area, and the solution adopted is best understood by reference to this basic plan.

A 6·6 kV or 11 kV primary distribution system is used, with numerous transformer chambers of 500 kVA capacity connected to it, and feeding an interconnected low voltage network. The h.v. system, run and operated as radial mains, is capable of interconnection. The h.v. equipment in each chamber transformer consists of a ring main unit (two isolators and a 300-amp 150 MVA circuit-breaker), the step-down transformer, and an 800-amp l.v. air circuit-breaker feeding a l.v. distribution board. Fuses can be inserted in the distribution boards, but otherwise the secondary network is laid out as a grid, interconnections being made at street junctions and other convenient places. Blocks of load of about 3 MW (six transformer chambers) will be interconnected on the l.v. side through h.r.c. fuse links.

The important feature of this scheme is that no reinforcement of l.v. copper is necessary once the l.v. grid is laid down. Load growth

Fig. 6. These three views of installation details show, on the left, the standard intake gear for flat installations, and, to the right, the circuit-breaker and auxiliary control gear in the lift motor room. The view of the rising mains in the centre shows the composite cleats for holding the cables



can be taken up by the construction of more transformer chambers, injecting energy into the network at intermediate points.

At Poplar, the primary distribution voltage is 6·6 kV, the three-core cables at this voltage being laid in ducts, as far as possible along the principal roads. One transformer chamber (Hind Grove) already existed in the area, and three others have been planned to meet the increased demand occasioned by the houses, flats and public buildings being erected under the scheme. One leg of the 6·6 kV ring main feeding the Hind Grove transformer passed within 100 yards of one new transformer and was split to feed this chamber (near Duff Street). The other leg was broken to allow a pair of cables to be run to the Paris Terrace transformer chamber, some 400 yards from Hind Grove. The third new transformer chamber, in Kerbey Street, is supplied from a separate section of the h.v. system.

Transformer Chambers

New transformer chambers are brick structures (Fig. 7) with internal dimensions of 13 ft 6 in. by 10 ft 10½ in., with a height from ceiling to floor of 8 ft 3 in. The h.v. cables are drawn into these from single-way ducts, coming up a short ramp and finishing behind the ring main unit. The l.v. cables are brought in through earthenware ducts from each side of the building to a 2 ft 8 in. by 1 ft 6 in. cable trench on the other side of the chamber. This trench is covered with ¼ in. chequer plating, and the air circuit-breaker and distribution board are located immediately in front of it; 600-amp 25 MVA breaking capacity h.r.c. fuses are used in the distribution boards.

The layout of plant in the chamber is shown by the two illustrations. Connection between the transformer l.v. terminals and the air circuit-breaker is made by taped copper bars run neatly round the walls of the chamber near ceiling height. Earthing of the transformer secondary star-point is carried out at the substation with multiple earthing rods.

Ventilation for the substation is allowed for by providing 2 ft 6 in. high louvres in the bottom half of the doors, and two 2 ft by 1 ft 6 in. louvred ventilators near ceiling level at the back of the chamber. Both pairs of openings are backed by a close mesh wire screen.

Advantages of the compact design possible with the layout described are exemplified by the particular chamber illustrated, which has its walls built in with those of a large school, and takes up a negligible part of the playground area.

L.V. Network

The 400 V/230 V four-core s.w.a., l.v. cables are of 0·2 sq in. copper section and are laid direct. At all road crossings, cables are drawn into ducts, spare ways being provided as standard practice. Some cable was already in the ground in the area, and where possible this has been jointed into the system. In all, some 3,050 yards of new l.v. cable is being installed. Four-way link boxes have been placed at cable intersections, although previous practice in the district had been to use pillars.

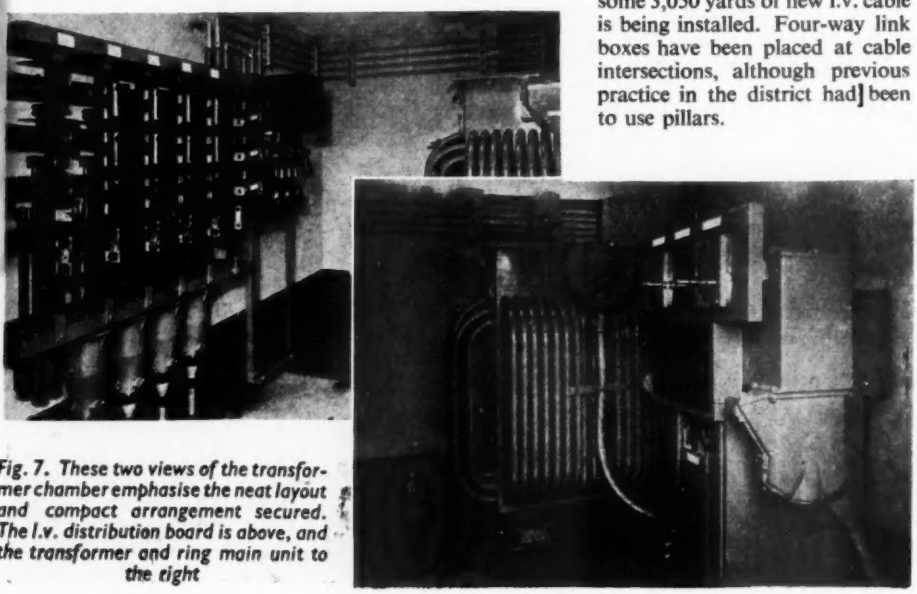


Fig. 7. These two views of the transformer chamber emphasise the neat layout and compact arrangement secured. The l.v. distribution board is above, and the transformer and ring main unit to the right

In the case of blocks of flats, the electricity board's services terminate in a sealing chamber, fuse units, and a t.p. and n. iron-clad switch of 500 V rating, which acts as an isolator. Some degree of standardisation is achieved by making this switch of 100- or 200-amp rating according to the magnitude of the load. Practice from this point varies, an investigation being made to determine the most economical scheme for each design of building, but in the block described a rising main is installed in a 10 in. by 5 in. chase and two distribution boards are installed to feed lateral sub-mains on the top two floors and on the bottom floor.

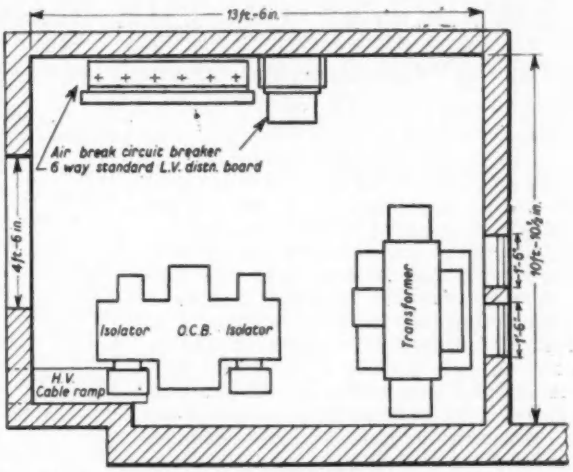


Fig. 8. Plan view of layout of the transformer chamber shown in Fig. 7

The rising main takes the form of four v.r.i. cables, held in fabricated steel and porcelain cleats, while the distribution boards have a fuse-holder and neutral bar assembly arranged to suit the number of flats to be fed (Fig. 6). The case and cleats are standard, and so ease maintenance and store-keeping procedure, and individual fuses are also standardised as 60-amp English Electric types.

The distribution boards feed 7/0·064 in. v.r.i. services which are carried to the meter cupboards of individual flats in conduit installed by the housing authority's sub-contractor. This conduit drops down in size as the various supplies are taken off, starting at 1½ in. for three services, and becoming 1¼ in. for two flats and 1 in. for one flat.

The routine for installing sub-services to flats involves early supply of the cases of the distribution boards so that they can be fixed during building work. The backs of the cleats —a steel strip with projecting studs—are then fixed to the back wall of the chase, and when a convenient stage in building operations is reached, the risers are pulled in and then clamped in position by threading the front and back sections of the cleats over the studs and clamping with a steel strip (Fig. 6).

Supplies to all the flats on one floor of the block are normally taken from a single phase of the rising main. The rising main itself may, however, be left out in cases where the disposition of the individual flats and their number makes it more economical to bring all 7/0·064 sub-services back to a single distribution board in the intake chamber. It will be noted from the description which has been given above that the Code of Practice recommendation to include an isolator at the foot of the rising main has been adopted on this estate, thus providing a readily accessible means for the estate staff to switch off the supply to any block in the event of an emergency (Fig. 6).

We have to thank the London County Council, electricity department, and the London Electricity Board, particularly the North-Eastern sub-area and the Poplar District staff, for assistance in obtaining the information recorded in this article.

Optical Projection in Schools

THE Council for Codes of Practice for Buildings has now issued for comment Code 412, "Installation of Optical Projection Equipment in Educational Establishments," prepared for the Council by a committee convened by the Illuminating Engineering Society. This Code deals with the provision and installation of optical projection equipment in schools and other educational establishments, and advises on the choice and location of such equipment. The Code is not applicable where inflammable film is used.

Various types of projection apparatus are described, recommendations being made as to the suitability of each type, and the arrangements required, for use in school halls, in lecture theatres and in classrooms.

The Code is in draft form and is subject to amendment in the light of comments which should be submitted by May 14, 1951.

Copies of the Code may be obtained from the British Standards Institution, 24-28 Victoria Street, London, S.W.1, price 5s., post free, reference CP(B) 1,000.

PROBLEMS OF THE MANUFACTURER

Value of Co-operation exemplified in B.E.A.M.A. Report

THE diversity of matters dealt with by the various committees and sections of the British Electrical and Allied Manufacturers' Association each year is almost legion, ranging from research, production, standardisation, education, to marketing and kindred subjects, yet uppermost in the minds of the majority of manufacturers at the present time is the question of supplies of raw materials such as copper, lead, zinc, cotton, etc. That B.E.A.M.A. is making every possible effort to help their member firms is seen from the report of the Association for 1950 to be submitted at the annual meeting tomorrow, April 20. It is known that B.E.A.M.A. has made strong representation to the responsible authorities stressing the vital needs of the Electrical Industry in the important part it plays in the export drive.

The Materials Committee, in fact, has surmounted many troubles, such as the reduction in output of welding electrode core-wire, where the threatened closure of the Linwood steelworks was eventually postponed. An up-to-date review of electrical sheet requirements has been undertaken, for the purpose of further discussions with the makers, and a comprehensive survey is being prepared of the minimum quantity of materials necessary for the electrical industry to maintain, and, if possible, to increase production. This latter data will be placed before the Ministry of Supply, to provide them with a reliable guide of the industry's requirements.

Plant Programme

Representations have also been made to the Minister of Supply stating the imperative necessity for an increased programme for providing additional power stations and distribution plant. The Minister has, in fact, promised to put the case before the Chancellor of the Exchequer, but at present there seems little chance of any substantial increase before 1955. It is claimed that the manufacturers of turbo-generating plant and electrical equipment are able to provide, in addition to meeting export requirements, up to a third more than the B.E.A. can order.

The adoption, as standard, by the B.E.A. of unit-sets of 30 MW, and 60 MW, and provisionally of 100 MW (with the majority of 60 MW capacity), has helped manufacturers to expedite delivery, of course.

Export Service

This year again, there will be found a lengthy report on the work of the Export Panel and of the Export Department, for of recent years these have assumed considerable importance. It is noted that the Panel has made substantial progress in the protracted negotiations with certain large individual purchasers overseas for the formulation of standard conditions of sale and payment. As a further development a new organisation, the Electrical Industry Export Service is being set up by the Association. It is hoped that this service will be in operation by next autumn.

Meantime, the experience of British manufacturers in overseas markets is being closely watched, particularly in regard to incursions by Japanese firms. Obviously S.C.A.P. policy was to put Japan on her feet quickly to reduce the heavy subsidies being paid, and the policy is to progressively reduce these subsidies. Trade Union activity is also being encouraged and this may eventually help to eliminate some of the effects of cheap labour, it is believed.

Work among the Sections, too, has been fully maintained. Proposals for standard dimensions on f.h.p. motors are still under discussion with the B.S.I., but for other industrial motors a draft specification is being drawn up. Experiments are being made into the effect of the use of cold reduced sheet on transformer design, meanwhile sheet steel makers are laying down extensive plant for the production of low-loss cold-rolled electrical steel, limited supplies of which should be available towards the end of this year. But most of the Sections and Committees refer to difficulties caused by shortage of materials.

Educational Work

Highlight of the year's work, however, is in regard to educational matters, with the endowment, through the generosity of its members, of a permanent Chair of Electrical Engineering at Cambridge University, and the launching, in collaboration with the F.B.I., of the Athlone Fellowship. This latter scheme will cater for the training in this country of an increasing number of engineering graduates from Canada. Great hopes are set on this Scheme, and the recommendations of the Committee on higher technological education.

Notes on Wiring
by MEGOHM

FIFTY YEARS AGO

Some Notes on the Pioneering Days in 1900

BROWSING through some old technical textbooks the other day, I came across one entitled "Electric Wiring, Fitting, Switches and Lamps," written in the year 1899 by that industrious writer on electric wiring, the late W. Perren Maycock, to whom so many of our now elderly engineers owe a debt of gratitude.

It is interesting to compare the information and advice there given with installation work as we know it today, and it is surprising to note how little many of the methods then evolved have changed up to the present day. Many of the firms then building up a connection as manufacturers are still household names, but others alas ! are no longer with us. Of the former, Dorman and Smith, Ediswan, Crompton, G.E.C., and Rawlings are a random selection, though I doubt if many of their present employees would recognise the goods produced by their firm in those distant times. *Autre temps, autres moeurs.*

Lamps

The first item that is prominent is the space required to describe the various types of arc-lamp then in use, and the methods employed to obtain the best results. I wonder how many of our present-day wiremen or technicians could sit down and sketch from memory the internal arrangement then used to obtain a steady feed to the carbons so as to compensate for their gradual combustion, explain the use of an "economy" coil or describe the principal features of the ten different makers of lamps then in common use.

For more ornate internal lighting the so-called glow lamps were universally used, though the "Nernst" was beginning to gain ground as its efficiency was about 1·5 watts per candle. The ordinary glow lamps were made in three grades, high, medium and low efficiency, absorbing approx. 2½, 3½ and 4 watts per candlepower respectively, so with any fair-sized installation the type of lamp selected would affect the circuit arrangements due to the heavy currents involved. As manufacturing methods had improved by then it was no longer necessary to wire the ordinary lamps in series, though this expedient was reintroduced later on, when the early metal-filament lamps first came on the market. One could have quite a bit of fun trying to match up three lamps in one fitting so that all three would burn with the same brilliance.

Early switches, as one might expect, were cumbrous compared to their modern counterpart, and those of the turn type and dolly type seem to have been equally popular. The open type with a piece of exposed fuse-wire were condemned as unsatisfactory, though fuses were invariably fitted in ceiling roses and under switch covers, as was found most convenient.

Various conduit systems were being developed and were fixed "exactly like gas piping." The "insulated" tube system had many adherents, though the "plain" tube system was gaining ground. In fact, Mr. L. M. Waterhouse had a lot to do with the development of the conduit system as we know it today, and Messrs. Simplex, happily still with us, produced at that time boxes and fittings differing not greatly from those we now use.

Rules and Ratings

Bondings and earthing as such received but scant attention, and was primarily used in connection with a.c. supplies as a safeguard against shock in the event of a breakdown of the insulation between the primary and secondary windings.

The I.E.E. Wiring Rules dated 1897 were brief and to the point, consisting of 15 short sections and a conductor table. The latter is rather interesting as it contains two columns from which it will be seen that 7/16 (7/·064 in.) can carry up to 34 amps max., or only 23 if the external temperature is above 100° F. The present rating is 56 for two conductors. A formula is also given whereby the ratings can be calculated as follows : $C=2{\cdot}6\ A^{0.82}$ where C=current in amps and A=area of conductor in 1,000ths of a square inch. Presumably our wiremen in those halcyon days were also expected to be mathematicians, or perhaps they took the line of least resistance and used the next larger size.

The Magnicon

A Rotating Amplifier with Armature Reaction Excitation

Part 2:

Application to Alternator Voltage Control

By J. GRIFFIN, A.M.I.E.E.

IT will be readily appreciated that the response of any rotating amplifier is to the nett control flux, i.e. to the nett control m.m.f. in the ordinary case in which the various control m.m.f.'s all act along the same magnetic circuit. Owing to the very high amplification made possible by armature reaction excitation the actual power required for the control excitation is so low that several sets of exciting coils can be accommodated on the control poles, the machine responding to their resultant effect. It is thus possible for the "integration" of a number of control signals to take place in the machine itself, eliminating the need for any external mixing circuit and retaining, if necessary, the electrical separation between the various signal sources.

An interesting example of this integrating feature occurs in the power factor control of a large synchronous motor; here the rotating amplifier supplying the main exciter field may have four sets of control coils—two (in opposition) actually responding to the motor power factor through a phase-sensitive circuit, a third providing convenient control of the upper and lower limits of main motor excitation, and a fourth providing a differential negative feedback as a stabilising or anti-hunt feature.

Alternator Voltage Control

One rotating amplifier application in which an increasing interest is being shown today is the use of the Magnicon for the output voltage control of alternators. The inherent regulation of a modern conventional alternator of small or medium output is generally about 25-30% at the usual nominal power factor of ·8 lagging. Some advantages—notably an economically large output from a given frame, with corresponding reductions in the transient and sustained short-circuit currents—are obtained by the adoption as standard of such a wide regulation, but these advantages must be balanced against the consequent absolute necessity in many cases to employ some form of automatic voltage regulator.

Modern automatic voltage regulators are the result of years of development, and are usually sound and reliable mechanisms—large numbers of alternators are giving satisfactory service equipped with one or other of the various electro-mechanical regulators available. Such regulators are of necessity, however, of comparatively delicate construction, and may require skilled attention at intervals to secure their optimum performance; this (together with their susceptibility to vibration) has to some extent prejudiced the alternator user against them. For large machines in well-maintained power stations or engine houses there can be little valid objection to the use of a conventional a.v.r., but for smaller machines to be installed in unfavourable conditions where absolute reliability is essential there is much to be said for some kind of static regulating equipment; examples readily to mind include machines for the Services, small power plants for isolated districts (particularly abroad), and stand-by mains-failure sets for essential services in hospitals.

It was to meet these needs that the Magnicon-controlled alternator was originally produced. In this machine the output voltage is controlled, by means of a specially designed Magnicon exciter, to within very close limits (usually

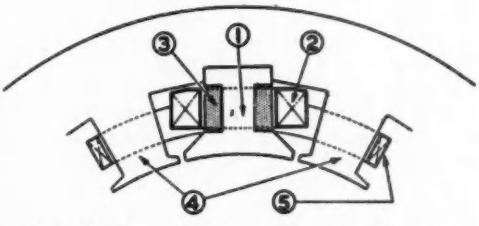


Fig. 6, Magnicon alternator exciter: special control pole

(1) Abutment pole. (2) Abutment winding. (3) Damping ring. (4) Opposition teeth. (5) Opposition winding

$\pm 2\frac{1}{2}\%$) of any desired value within the normal range of the alternator itself, irrespective of the magnitude of the load, its power factor, or (within reasonable limits) the speed.

The Magnicon Alternator Exciter

It has already been noted that where all the control m.m.f.'s act along the same magnetic

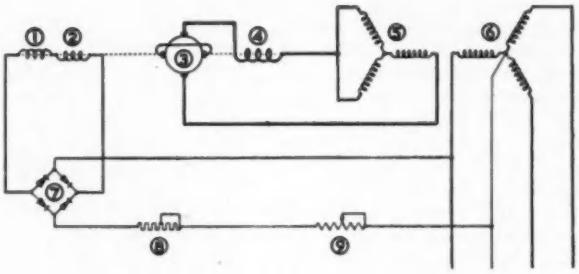


Fig. 7. Magnicon alternator-circuit diagram

(1) Opposition winding. (2) Abutment winding. (3) Exciter armature. (4) Exciter compensating winding. (5) Alternator field winding. (6) Alternator armature winding. (7) Control circuit rectifier. (8) Temperature compensating ballast resistance. (9) Hand regulator

circuit the response of a rotating amplifier is to their nett effect. There is thus no inherent difficulty in using such an amplifier as a regulator by superimposing on a constant "reference" m.m.f. a negative feedback m.m.f. dependent on the ultimately controlled quantity; the small (and necessary) "error" produces the excitation required to maintain the controlled quantity between the required limits. In the practical application of this simple principle to alternator voltage control, there is, however, one important difficulty—the provision of a satisfactory reference m.m.f. It is possible, at the expense of some complication, to avoid this difficulty by the use of some sort of "intersecting-impedance characteristic" circuit external to the amplifier, but the special construction of the Magnicon makes possible a much simpler and inherently more reliable solution—the provision, within the machine itself, of the required reference quantity.

It will be remembered that the use of the half-span or four-pole armature winding in the Magnicon results in the almost complete separation of the control and main fluxes. The magnetic circuits on the control and main axes are thus variable independently (as to air gap, saturation, etc.) during the design of the machine, and it is from this important advantage that the suitability of the Magnicon for alternator voltage control arises; the need for any external reference source is eliminated by utilising the magnetic saturation of a special insert in the control pole. This insert is excited by means of a winding which does not embrace the rest of the control pole, and the necessary feedback is provided by an opposition winding spanning the remaining and unsaturated part of the pole.

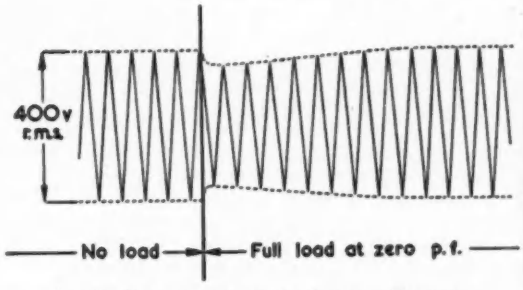
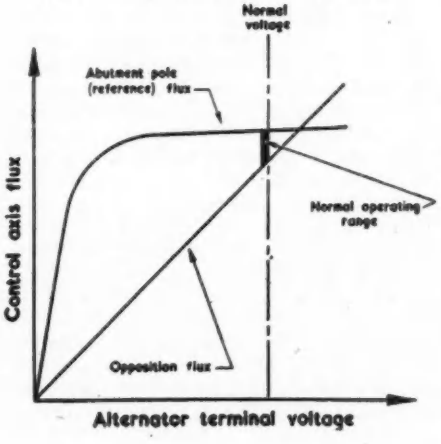


Fig. 9. Alternator terminal voltage oscillogram

Fig. 8 Magnicon exciter control fluxes



Operation of Control Pole

Fig. 6 shows in detail the appearance of the special control pole. The central tooth of a three-tooth pole is replaced by a specially shaped "abutment pole," the magnetic cross-section of this pole being relatively small by comparison with the total cross-section of the two remaining teeth. The abutment pole is surrounded by a solid copper damping ring, and it is excited by a winding directly surrounding

the damping ring*; a second and much lighter opposition winding is wound outside the flanking teeth, thus embracing the whole of the control pole. These two windings are in series, and they are excited by a small rectifier whose a.c. side is supplied from the alternator output terminals; a small hand regulator and a temperature compensating resistor are included on the a.c. side. The entire circuit is shown in Fig. 7.

The cross-section of the abutment pole and the m.m.f. of its exciting winding are so chosen that the pole is completely saturated at well below the minimum voltage for which the alternator is designed, notwithstanding the effect of the opposing m.m.f. of the opposition winding; the flux established along the control axis by the abutment winding thus remains sensibly constant over the required range of alternator voltage. The two flanking teeth, however, being of so much larger a magnetic cross-section, and subjected only to the m.m.f. of the light opposition winding, are substantially un-saturated; the flux established by the opposition winding along the control axis is thus almost directly proportional to the m.m.f., i.e. to the alternator output voltage.

The two separate magnetisation characteristics—for the abutment pole and the opposition circuit—are shown to a base of alternator voltage in Fig. 8. The resultant control axis flux, and thus the output of the exciter, depends upon the difference between these two fluxes, each of which has a quite separate existence as far as the armature conductors are concerned. Clearly there exists, for any particular alternator terminal voltage, a corresponding and quite definite nett flux on the exciter control axis, and thus a definite exciter output; it is a relatively simple matter so to design the control circuit that by adjusting the small hand regulator the alternator voltage required is obtainable. Once thus set for any voltage, the exciter amplification is so high that the outputs required to maintain the alternator at this voltage over the entire load, speed, and power factor ranges are all obtainable with the nett control excitation provided by a very narrow alternator voltage range. In this particular application a small degree of over-compensation is used to improve still further the resultant alternator voltage characteristic.

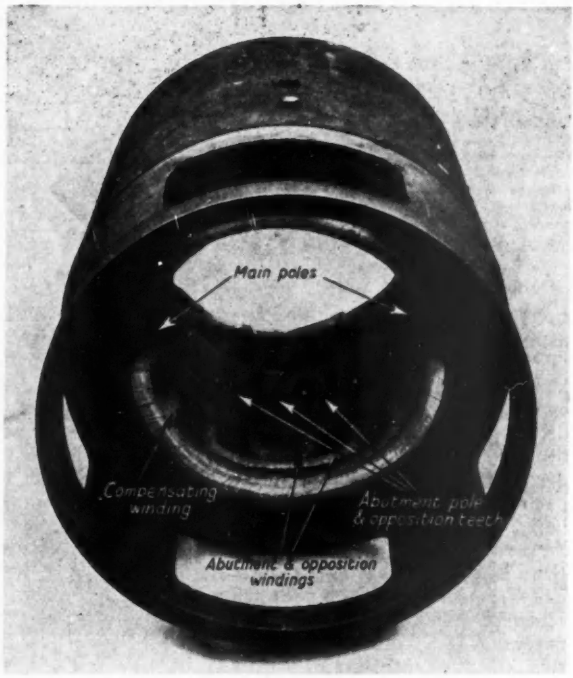


Fig. 10. Construction of Magnicon stator

The construction of the alternator itself is somewhat unorthodox in that the exciting winding is of the phase-wound type normally adopted for the secondary circuits of synchronous induction motors. The distribution of the exciting winding and the lamination of the entire magnetic structure contribute materially to the rapidity of response of the system as a whole.

This response can be clearly seen in Fig. 9, which is a reproduction of an oscillogram of the terminal voltage of a 62½ kVA Magnicon alternator during the switching on of full load at zero power factor lagging. The terminal voltage is seen to be restored to its normal value in one-fifth of a second (ten cycles at a frequency of 50 cycles per second) without any overshoot.

The author wishes to thank the directors of Crompton Parkinson, Ltd., for permission to publish this article.

* The function of the damping ring on the abutment pole is to maintain the reference flux at its normal value for a brief period on the occurrence of a sudden and severe voltage dip; the series connection of the abutment and opposition windings is also of assistance in the maintenance of stability during such transient conditions. Further, the "rectifier ripple" in the control circuit current is largely eliminated by the action of the damping ring.

Problems and Practice

IN ENGINEERING

Faulty Interpole Coil

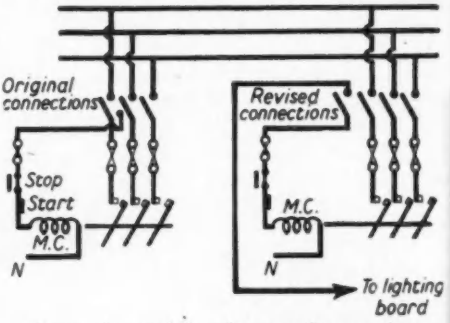
A SHORT time ago I was called upon to investigate trouble being experienced with a 60 h.p. 440 V d.c. motor driving machinery in a corn mill. It was reported that on two occasions the motor had stopped of its own accord when running on normal load. Efforts to trace the cause, without completely dismantling the machine, had not revealed any apparent fault, and an attempt to restart the motor had been successful on both occasions. However, the uncertainty of the position and the fear that a further stoppage would occur at a most inconvenient time due to the same unknown cause called for further enquiry.

At my visit I found that only a few minutes earlier the trouble had recurred, and I was fortunate in being on the spot before anything had been disturbed. The starter handle remained in the full-on position, but fell back on switching off the supply. The fuses were intact. This seemed to indicate that the shunt field circuit was complete at least. The motor, starter and cables were free from earth faults, but tests for continuity revealed the presence of an open circuit in the armature-interpole-series field circuit. Tests narrowed the fault down to the bottom interpole coil, which was closely examined. This coil had been damaged by an earth fault between its bottom turn and the motor frame, which fault had apparently cleared itself, but burnt through the copper. When cold, contact existed between the severed parts, but when hot and carrying current, further burning, consequent bad contact, and perhaps expansion and separation had occurred, eventually opening the armature circuit. Ingress of oil from the bearing, causing deterioration of the insulation between the interpole coil and the frame, was the initial cause of the trouble.—*V. A. R.*

Current Rush Welds Contacts

THIS experience concerns two high-speed 160 h.p. 400 V squirrel cage direct-on starting motors. They drive high pressure pumps for the station ash plant and the starting current is approximately 1,200 amps. The switchgear is all contactor gear with the coils energised from one phase and neutral. Considerable difficulties were experienced with the contactors welding in on several occasions, each one entailing making the whole board dead before the isolator could be opened (we found by experience that the isolator could not be opened successfully under load!)

The switchgear manufacturers reinforced the contacts and altered the design of the coils, but the welding still occurred at intervals. Finally,



First and second thoughts on coil connections

a check was made on the voltage at the contactor coils on starting, and it was found that the current rush caused the volts to drop and the contactor contacts to move slightly apart. The solution to the trouble proved to be quite simple after that. A separate supply was taken to these two coils from an adjacent lighting board that in turn was fed from a different part of the station l.t. system. Since then no welded-in contactors have been reported and the maintenance on the contacts has decreased considerably.—*H. T. W.*

Name Plate Misinformation

WITH reference to the note by Mr. E. Robbins in the "Problems and Practice" columns of the March 29 issue, it would seem that the answers to queries (a) and (b) could possibly be supplied by the makers. It is, indeed, unusual for a motor, apparently rated at 1,800 r.p.m., to run at only 1,200 r.p.m. on full field. The losses in the field coils on 440V. are approximately 900 watts (roughly four times the value one would expect in a machine of this size) and it is evident, therefore, that they were not designed for this voltage. It would be interesting to know the p.d. across the coils (or the value of the field current) when the machine is running on load at rated speed.

The duty and the source of excitation of the

alternator are not stated, but if the excitation supply is separate from the set, it may be that the motor field coils were, for some reason or another, intended to be supplied from this source and the shunt regulator is merely for close speed adjustment to enable a correct frequency supply to be obtained from the alternator.

With regard to point (c), it is often possible to estimate the number of turns in a field coil by counting the number of layers and the number of turns on the outer or the inner layer, the product of these values being the total number of turns. If the conductor size is measured, the resistance of the coil may be calculated by using the formula :

$$R = \frac{\varrho \times Z_{mt} \times N}{a}$$

where ϱ = resistivity of copper ($0{\cdot}67\ 10^{-6}$ ohm-inch at 60 deg. F.) Z_{mt} = length of mean turn. N—number of turns. a = cross-sectional area of the conductor.

If the value obtained by this method comes within about 5% of the measured value, the coils may be taken as satisfactory so far as short-circuits between turns are concerned.—*S. Woodhouse.*

REFERRING to the notes on "Name-plate Misinformation" in the issue of March 29, and to Mr. Robbins' query as to what other procedure could have been adopted, the facts prove that the maintenance engineer should never be too eager to accept a diagnosis that rests on such improbable facts as four faulty coils having the same ohmic value. The motor after drying out, should have been re-built and the speed taken, when on finding this to be low and the field coils heating up, a field resistance should have been used to obtain the correct rated speed. This would have reduced the field coil temperature to normal and so brought attention to the actual starting device, for it is not unknown to find a permanent resistance in the shunt field circuit.

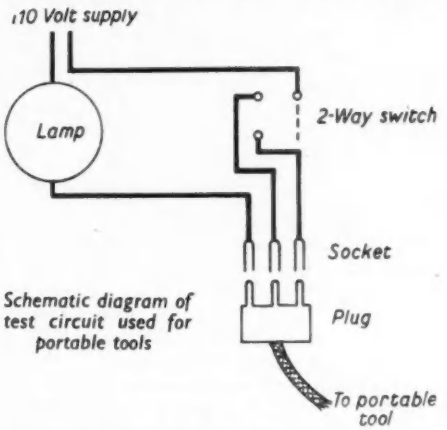
With regard to point (a). If the motor had been designed for variable speeds, these should have been stated on the label inscription, viz., 1,800/2,400 r.p.m. This would have indicated at once that field resistance was employed.—*T. H. Snelson.*

Electricians Are Needed

WHENEVER possible, an electrician should be on hand in factories when electrical gear is operated, as the following story emphasises. On a report that a star/delta starter was causing trouble, I went to the starter and found smoke and melted shellac emerging from it. The starting handle had been fastened with string in the running position, and I noticed that the trip arm had been taken off. The laminated plunger had fallen out from the interior of the no-volt coil, and the coil itself was excessively warm, due to this fact. The trouble had originated during the night shift, with no electrician on duty, and when the starter kept on tripping the machine operator considered that the best cure was to remove the trip arm and tie up the starter handle. The prime cause of the trouble was a loose contact on one phase of the starter.—*A. W.*

Testing Portable Tools

IN a maintenance shop which is responsible for the servicing of 3-phase high frequency portable tools of many types, it was agreed that breaks in the cable leads constituted the largest bugbear of the lot. So as to leave both hands free to explore along the length of the cable a panel was made up fitted with a socket common to that installed in the works. By means of two-way switch control the tell-tale indicating lamp will show in which phase the break lies.—*W. J. Coull.*



Schematic diagram of test circuit used for portable tools

Too Much Fusing

THE failure of a railyard light made an inspection necessary. An iron ladder leading to the fitting was found to be alive, and so was the controlling i.c. switch on the pole. After knocking off the switch, an earth on the system disappeared. Closer inspection showed that a length of fuse wire was protruding from its carrier and touching the iron case. The overhead earth wire had failed, and contact was made through the pole to the ground. The faulty fuse repair had been carried out during night work in extremely bad light.—*H. Mitchell.*

SEVENTY YEARS OF DISTRIBUTION

First Public Showing of the Hunter-Hazell Historical Cable Collection

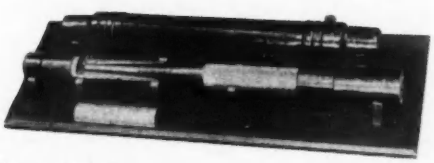
Mr. P. V. Hunter

Mr. J. T. Hazell

HISTORY of electrical distribution from its earliest days was illustrated last Thursday by the first public exhibition of the Hunter-Hazell historic cable collection. Believed to be the most comprehensive in the world, the collection is the result of over 18 years' single-minded enthusiasm on the part of Messrs. P. V. Hunter and J. Temple Hazell, of British Insulated Callender's Cables Ltd., at whose London offices the exhibition has been staged prior to its transference to the Science Museum as a permanent national record of progress in the art.

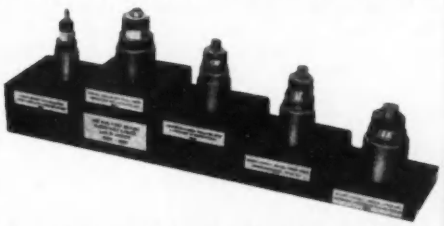
Earliest exhibit is the Edison "tube" containing two "D"-shaped solid conductors held in cardboard spacers in an iron tube filled with compound. This, dating from 1882, was used in the Holborn Viaduct installation, and actually precedes the famous Pearl Street installation in New York. Several examples are shown of expansion joints, straight, tee, Y and right angle joints for this system, some of which have been modified since their original installation by tee-off connections in more modern cables.

At the other end of the exhibit is a specimen of the world's largest underground cable, a three-core 0·6 sq in. 132 kV gas pressure cable of which 18 miles are being at present installed for the B.E.A. between Barking and Ilford. The history of the transmission of electric power is summarised in over 90 exhibits which bridge the gap between 1882 and 1951, and include many types which are familiar in name only to the modern engineer, and not a few that would only be known to a research student of early cables.



The original demonstration joint used by Dr. Ferranti for training jointers for the 7000 joints on the Deptford 10kV conductors

Many of the specimens are unique—for example the original glass insulators as used in Crompton's strip system laid down in Kensington in 1884, and specimens of experimental cables of which short lengths only were manufactured, not to mention the actual demonstration joint which Ferranti used in training jointers on the Deptford conductors in 1889. The story of how many of the specimens came into the collection would itself fill a book, and the list of those who have assisted would form a suitable appendix. It is small wonder that the Science Museum authorities are keen to acquire the collection for the nation.



Souvenir group of the first five cables made in Gt. Britain for 10 kV. L. to r. Fowler-Waring fibre insulated and braided concentric (1889); the famous Ferranti tubular main; B.I. flexible paper-insulated cable; Siemens non-hygroscopic; B.I. flexible concentric

The exhibition made a suitable inauguration for the new display centre at Bical House, Bloomsbury Street, on Wednesday night, when the chairman and directors of B.I.C.C. acted as hosts to a gathering representative of the B.E.A., the I.E.E., and other distinguished bodies. During the course of the proceedings Sir Alexander Roger (chairman, B.I.C.C.) presented to Lord Citrine, as a memento,

Another specimen of the B.I. Wire Co.'s 10 kV flexible concentric cable which is particularly interesting in that with its capacity of over 7 MVA per phase it would have been capable of carrying London's entire load at the time of its installation. Segmental conductors of 0.54 sq in. were used, the inner conductor being built up over a rope core. Forty-two miles were ordered by the Metropolitan E.S. Co. in 1898

Sir Alexander Roger (chairman B.I.C.C.) presenting the souvenir group of cables to Lord Citrine

a souvenir group incorporating sample lengths of the first five 10 kV cables produced in this country and laid in London. These are the Fowler-Waring fibre-insulated and braided concentric (1889), the Ferranti tubular main (1890), the B.I. Wire Company's flexible paper-insulated cable (1896), the Siemens non-hygroscopic cable (1896) and the B.I. Wire Company's flexible concentric (1898).

The exhibition will remain open until April 27. Admission is by ticket, obtainable from B.I.C.C. at 21 Bloomsbury Street, W.C.1, or from any of the company's branch offices.

Faraday Shields go North Again

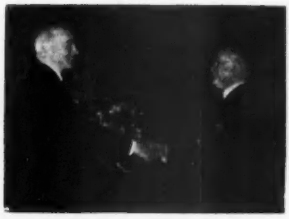
TRADITIONAL rivalry between the Red Rose and the White Rose seemed forgotten last Thursday, when Lancashire and Yorkshire combined against all comers to win first place in the E.D.A. Public Speaking Competition.

In the morning, Mr. Roy Stewart (Bootle Service Centre, Merseyside and N. Wales Board) took first place with a talk on "Artificial Illumination," with Mr. R. J. Stevenson (S.W. Scotland) and Mr. R. F. Alden (Southern) second and third.

The same afternoon, Miss Barbara Hanforth (Leeds Service Centre, Yorkshire Board) took first place, her subject being "Leisure Hours." Second and third places were taken by Mrs. Ward (Eastern Board) and Miss Patricia Owen (North-Western Board).

The winner of the women's competition, Miss Barbara Hanforth of Leeds, (Yorkshire E.B.), receiving the shield from Mr. E. R. Wilkinson

Mr. C. T. Melling presenting the shield to Mr. Roy Stewart of Bootle (Merseyside and North Wales)



Finalists in the Women's Competition, Standing (l. to r.) Miss Patricia Owen (Disley, North Western E.B.), Mrs. Margery J. Conway (Liverpool, Merseyside and North Wales), Miss Angela Murphy (Reading, Southern E.B.), Mrs. A. E. Alexander (Sidmouth, South Western E.B.), Miss Menna A. Rees (Llanelly, South Wales E.B.), Miss Maureen G. Weston (Islington, London E.B.), Miss Barbara Hanforth (Leeds, Yorkshire E.B.). Sitting (l. to r.) Miss Barbara E. Heselton (Baldon, North Eastern E.B.), Mrs. M. Leighton Smith (Glasgow, S.W. Scotland E.B.), Mrs. Winifred E. Ward (Barnet, Eastern Electricity Board)

Finalists in the Men's Section, Standing (l. to r.) Mr. Roy Stewart (Bootle, Merseyside and North Wales), Mr. Alexander J. Begbie (Torbay, South Western E.B.), Mr. Desmond P. Benson (Barnet, Eastern E.B.), Mr. Kenneth Prescott (Grimsby, Yorkshire E.B.), Mr. Roderick J. Stevenson (Glasgow, S.W. Scotland E.B.). Sitting (l. to r.) Mr. Hayden P. Roderick (Pembroke, South Wales E.B.), Mr. Roy F. Alden (Portsmouth, Southern E.B.), Mr. Wilfred Butler (Oldham, North Western Electricity Board)

The Plant Shortage and Load Control

THE E.D.A. ANNUAL LUNCHEON

Lord Citrine reviews this year's progress

ALTHOUGH the Electrical Development Association Annual Luncheon followed closely on the Budget, a discreet silence was maintained on the subject of the increased purchase tax on electrical appliances. However, the disclosure that large scale tests on load control were being carried out in three areas interested the well-attended gathering.

The toast of "Electrical Development" was proposed by Sir James Turner, President of the National Farmers Union, who, in speaking of rural development said, "there will come a day when electricity will be courting rural communities." He reminded listeners that farms are users of off-peak load, and this should be kept in mind when considering rural development. He deprecated capital charges for services and stated that the Union favoured instead the adoption of minimum guarantees. Concluding, he said there was no answer to inflation other than increased production, and this includes farming as a basic industry.

A review of the progress made in electricity was given by Lord Citrine in responding to the toast. He spoke of the increased consumption of electricity, and pointed out that the number of farms electrified has risen from 78,963 to 108,520 since vesting day. The gap in output capacity continued to be a major problem and load controlling devices are now being subjected to large-scale tests in certain areas. Turning to the results of the rearmament programme, he said that the adverse effect of shortages and delays is apparent on the plant due to be commissioned this year, and it will tend to increase in connection with later programmes. The Government had decided that the amount of plant which could be installed in any one year should be limited to 1,500 MW, but it had been repeatedly stated that unless this can be increased to 1,800 MW it will be many years before a full supply of electricity is available. The distribution system also is running with practically no margin of safety, and the risk of breakdown is serious. He fervently hoped that in the effort to find means of carrying the immense financial burden, the Chancellor of the Exchequer will make no attempt to curtail the programmes of development of the supply industry. He made that statement because the part played by electricity in the life of the country is not yet fully recognised.

In proposing the toast of the guests, Mr. Wilkinson expressed thanks to industry for the help that the B.E.A. had received during the difficulties of load shedding. Recently, the Minister of Fuel had said that load cuts cost industry about 8 to 10 million pounds. Such a figure would pay for the capital charges on 1½ million kilowatts of plant which would avoid such losses. In addition, by reason of the high efficiency of the new plant, it would save 1½ million tons of coal or £3½ million.

The response was by Sir Norman Kipping, Director-General of the F.B.I. He spoke for the bulk of industrial consumers who want electricity supply to keep pace with the progress in mechanisation. Interruptions could be avoided by methods other than adding to costly plant. He preferred to speak of the valleys rather than peak loads, and asked where are the inducements for industry or even the domestic consumer to spread the load? What tariff concessions are offered? To advance with expansion of plant only is a mistake.

Annual Meeting

Following the luncheon, the annual general meeting was held at which Lord Citrine was appointed president for the fourth term of office. A vice-presidency for the period 1951-1954 was accorded to Sir Henry Self and Dame Caroline Haslett. Lord Beveridge and Capt. J. M. Donaldson were re-elected vice-presidents.

At the subsequent meeting of the E.D.A. Council, Mr. C. T. Melling was appointed chairman, and Mr. H. Nimmo, who has been chairman of the E.D.A. rural electrification advisory committee for the past three years, becomes vice-chairman.

overseas news

Extension

Electric light and power amenities for towns and farm settlements up to 80 miles west of Dalby, Queensland, will follow a £500,000 distribution extension programme now being carried out by the Dalby Town Council. Alderman Jack, who has been Mayor of Dalby almost 21 years, said the council was actually doing the work of a regional electricity board. Capital value of its electricity undertaking was now nearly £500,000 and would soon be increased to £1 million. An Order-in-Council last month authorised the council to borrow £10,500 to further its electricity project. Of this sum £2,500 is to be spent on radio-telephone equipment for rapid communication with maintenance staffs on extending power lines.

Brighter Outlook

Considerable relief at the news that the South Fremantle power station would be in operation before next winter was expressed at the recent meeting of members of the Western Australia Chamber of Manufactures. For these concerns were perturbed at the added costs they had to bear when resorting to the use of auxiliary plants during emergencies. The Associated Chambers of Manufactures in a recent submission to the Minister for Trade and Customs sought a remission of duty on fuel and oil used in auxiliary generators. In this it was pointed out that to produce electricity by such plant cost three times as much as current taken from the mains.

Tasmania's Plans

Plans for further hydro-electric developments are to be placed before the Tasmania Parliament during the current session, announced Sir Hugh Binney, the governor, when formally opening the Parliament a few days ago. The Hydro-Electric Commission had been investigating a number of possible schemes since 1947, he said, and its recommendations would be incorporated in a bill to be submitted to Parliament. The Commission had not sufficient constructional resources to start another large-scale scheme in addition to the works already in progress. However, as generating plant could not be obtained until three or four years after ordering, orders had to be placed well in advance. Preliminary arrangements for construction of the civil engineering works would be put in hand as soon as the scheme was approved by Parliament, but large-scale work would be delayed until other schemes were nearing completion. Referring to power rationing, Sir Hugh said the Commission had been enabled to bring the load on the system under control. It was impossible to forecast when the Tungatinah power scheme would be operating, but the Butlers Gorge station and the additional generating set at Tarraleah, with a total of 38,000 h.p., would be in use within the next few months. Some degree of rationing would have to continue while drought conditions persisted, however.

Plant Needed

The chairman of the Electricity Commission of New South Wales, Mr. Conde, is to fly to America within the next few weeks in an effort to expedite delivery of the 12,000 kW packaged generating units ordered recently. The first of these sets is expected in Sydney any day now.

Power Plant Wanted

Brisbane, now, is entering the rush to buy "packaged generator units" from America. We understand that the Stores Board has recommended the City Council to call for quotations from two firms. A set with a capacity of 10,000 kW is wanted, the estimated cost of which is given as about £1,000,000; with delivery in Australia in 12 or 15 months' time. The Lord Mayor has pointed out that some difficulty in supply might be caused unless the new generator was purchased. The Electricity Department has already intimated that it will be "touch and go" this winter, and, to prevent the possibility of power rationing, the Council has decided to postpone the introduction of the first of the trolleybus services in Brisbane until August at least.

W.A. Report

The first year's working of the State Electricity Commission of Western Australia was not exactly auspicious, judged by the report for that year (to June 30, 1949), just received, for a loss of £295,922 resulted. Arrangements have already been put into force which should at least reduce the deficit, now that the Commission stands on its own financially. The Commission of course took over the Perth supply system, and also assists the country undertakings by hiring generating sets; a number of which are on order. East Perth generating station generated over 220 million units (slightly less than in the previous year), coal consumption being 2·54 lb/kWh. At Collie power station, fuel consumption was 3 lb/kWh for the 17 million units generated. Reference is also made to the South Fremantle station which is soon to be working. The Commission, by the way, were also responsible for operating the Perth gas undertaking!

Commission's Advisory Committee

Augmenting the provisions of a Bill passed in 1944, an Advisory Committee to the Hydro-Electric Power Commission of Ontario is to be formed, Premier Frost an-

nounced earlier this month. The 1944 Bill stipulated a five-man Committee but under a new amendment to the Power Commission Act, the number will be extended to not more than nine persons. The task of the new committee will be to study and report on any matters referred to it by the Commission or on any other matters the committee may decide relative to the operation of the Hydro-Electric Power Commission. The committee, on which there will be one woman, will include representatives of the Ontario Municipal Electric Association and the Association of Municipal Electric Utilities. Thus, for the first time in Ontario, the Municipalities will have direct and official contact with the Power Commission.

Campaign Needed

Although total revenue of the Saskatchewan Power Corporation increased by 13%, much promotional campaigning is required if electricity consumption in the province is to compare with that of other provinces, it is stated in the report for 1950 just published. Last year a further 5,000 consumers were added bringing the total to over 63,000. The farm programme in its second year, connected just over 2,000 farms, compared with 1,100 in 1949. But the "serious lack of appreciation of the value of power as compared with other services" (as the report puts it) is evidently perturbing the Corporation.

Sales Depleted

Recent regulations governing hire-purchase agreements, under which the initial payment must be one-third of the total cost, had seriously affected orders for all electrical goods, many speakers emphasised at this month's convention of the Canadian Association of Radio and Appliance Dealers, held in Toronto. The Association president, Mr. J. Cheshire, of Hamilton, said his sales had dropped 25%. Others put the figure as high as 30%, and most expected shortages of electrical equipment. One representative of a washing machine company predicted a scarcity of his product within three months.

Survey of Potential Power

The Engineering Board of the International Joint Commission has set up Canadian and United States work groups to study the possibility of obtaining 500,000 additional horsepower of electricity from the St. John River, it was announced recently by Dr. H. J. Rowley, chairman of the New Brunswick Resources Development Board. Already, in Maine, a site has been found where a dam 240 ft high could be erected to flood 55 sq miles and generate 250,000 h.p., it is reported. The Canadian and U.S. work groups, which have already launched their studies, are scheduled to meet in June to go over preliminary data on all potential storage sites and determine which are the most promising.

Making it Clear

A type of directive which, to some, could well be adopted elsewhere with beneficial results, was given in the Nova Scotia Legislature a few days ago. Apparently the inhabitants of the islands of Big and Little Tancook had several times asked the nearby Chester Light and Power Co. for a supply, but without result. That concern takes a bulk supply from the Nova Scotia Power Commission, but it would be impracticable for the latter to erect the necessary line. So the Legislature has resolved that the company shall be taken over by the Power Commission unless it extends its service to the islands by the end of this year.

Spain's Railway Plan

Well satisfied with experience of electric traction, Spain's State railways have now put forward a new plan for railway electrification, including the trunk line which runs from one end of Spain to the other—from Hendaye to Algeciras, a distance of 820 miles, we understand. This line is the backbone of the country's railway network, and if it were double-tracked throughout, as well as electrified, it would provide a vastly improved system. At present only 195 miles of the Hendaye-Algeciras line has electric traction and about 480 miles are double-tracked. The present five-year plan provides for the electrification of 816 miles of line. Priority would be given to the Miranda-Alsasua section on the main Hendaye-Madrid line, and the Baeza-Santa Cruz de Mudela stretch of the Madrid-Algeciras. The stiff climb up from Algeciras to Ronda is also high on the priority list. The improvement electrification could bring to Spain's mountainous railways is shown by the electrifying last year of the steep Pass of Branuelas, in the Ponferrada coalfield. Here, 12,000 tons of coal is now shifted daily instead of 4,000 tons.

Standards in Pakistan

Arrangements to set up the Pakistan Standards Institution were at last finalised at the General Council of the Institution, in Karachi recently. The proposal to establish a Central Standards Organisation followed from the recommendation of the first Industries Conference held in December, 1947, which expressed the view that "the trend of modern industrial development indicates the supreme value to the country of standardisation." The Director-General of Supply and Development, in consultation with various organisations in the country and abroad, prepared a scheme which has generally been accepted by the Provincial Governments, States, Chambers of Commerce and other Industrial and Technical Organisations in Pakistan. The Institution will provide, through the Central Testing and Standards Laboratories of the Government of Pakistan, or otherise, facilities for examination and testing of commodities, processes and practices and investigational research that may be necessary.

Modernisation

The latest type of electric furnaces are to be installed in new crematoriums to be established around Delhi, the first of which is to be sited at Ridge Road, New Delhi, we understand.

PERSONALITIES

IN THE INDUSTRY

Falk Stadelmann and Co., Ltd., have nominated **Mr. D. Bentley** as head of their Illuminating Glassware Department in succession to Mr. C. H. Bailey. Mr. Bentley has been with the company since 1929, and spent the next 10 years in various departments at head office. Following war service, he rejoined the firm in December, 1945, as assistant manager in the Glassware Department.

Mr. D. Bentley

Closely associated with the history of Hubert Davies and Co. Ltd. for over 50 years, during ten of which he served as the company's chairman, **Mr. J. H. Dryburgh** has decided to relinquish that position with this well-known South African concern, while still remaining a director. **Mr. R. Paget,** managing director, has been elected as the new chairman.

At the recent annual meeting of the Association of Chemical and Allied Employers, **Mr. H. V. Potter,** B.SC., F.R.I.C., M.I.Chem.E., chairman and managing director of Bakelite Ltd., was appointed chairman of the Association. Mr. Potter has been a member of the Association's executive board since 1941, and vice-chairman since 1948. **Mr. F. J. Robinson,** M.B.E., A.R.I.C., M.I.Chem.E., was again elected vice-chairman of the Plastics Group of the Association.

A luncheon was recently given at the Dorchester Hotel to **Mr. H. M. Spiers,** editor of *Technical Data on Fuel*, to mark his 23 years' editorship of that standard work. Sir Vincent de Ferranti, chairman of the British National Committee, World Power Conference, was in the chair, and among those present was Sir Ernest Smith, chairman of the "Technical Data on Fuel" Committee. While proposing a toast to Mr. Spiers, Sir Vincent de Ferranti announced that the first large impression of the fifth edition of *Technical Data on Fuel*, published in September, 1950, was nearly exhausted, and that a second large impression would be published in a few months' time.

His many friends in the industry will be interested to hear that **Mr. Alan J. Dussek,** chairman and managing director of Dussek Bitumen and Taroleum Ltd., has been elected Master of the Worshipful Company of Paviors for the current year. He is supported by **Dr. T. Howard Butler,** J.P., chairman and managing director of Wm. Butler and Co. (Bristol) Ltd., as Upper Warden, and **Major R. A. B. Smith,** M.C., A.M.Inst.C.E., M.I.Struct.E., M.Inst.T., consulting engineer, as Renter Warden.

As earlier foreshadowed, **Sir Stanley Angwin** has been unanimously elected chairman of the Commonwealth Telecommunications Board. Sir Stanley Angwin was largely responsible for inaugurating the transatlantic telephone service in 1927. He became chairman of Cable and Wireless Ltd. and of the Radio Research Board in 1947, having previously been engineer-in-chief to the G.P.O. In 1945 he was one of a party which made a world tour to investigate telecommunications in the Commonwealth.

Power house superintendent to the Ford Motor Co. Ltd. at Dagenham since May, 1945, **Mr. J. J. Young** has now been promoted to manager of the power department.

Sales manager of Unity Heating Ltd., **Mr. A. Capper Young** has now been appointed a director of that firm, we learn. He will still remain responsible for sales matters. Mr. Capper Young is a member of the Electrical Research Association, Management Research group, and also the Executives Association of Great Britain.

Mr. A. Capper Young

Mr. Ralph Gordon-Smith has been appointed a director of Electric and Musical Industries Ltd.

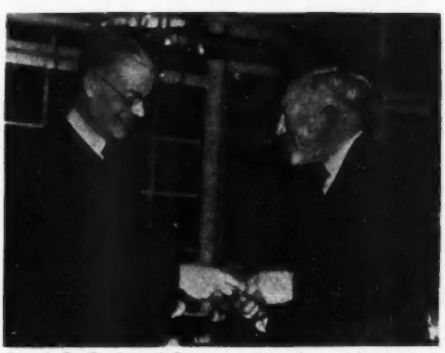
Newman Industries, Ltd., Electric Division, announce the appointment of **Mr. H. McConchie** as branch manager of their new branch office at Russell Chambers, Merrion Street, Leeds. He is already well known in the industry, for apart from being a past chairman of the Leeds branch of the Association of Supervising Electrical Engineers, he has had previous experience with George Ellison Ltd., H.V.E. (Electrical) Ltd., Brandon Electric Ltd., and Thomas Smith and John Brown Ltd.

Mr. H. McConchie

Formerly sub-area administrative officer, Western Sub-Area of the South Wales Electricity Board, **Mr. J. Carter** has been appointed to a similar position in the Board's Central Sub-Area in succession to **Mr. H. W. Carter,** who has now joined the South Wales Division as principal assistant secretary. Other appointments of the Board are: **Mr. G. Haring,** previously assistant district engineer, S.W, Birmingham district of the Midlands Electricity Board, to be district engineer, No. 345 District (Pontypridd, Caerphilly), and **Mr. S. G. Pain** as assistant engineer (transport) in the chief engineer's department of the Board. Mr. Pain was until recently transport officer of the Central Gloucester Sub-Area of the Midlands Electricity Board.

Just returned from a week's visit to Sweden at the invitation of the Royal Swedish Academy of Engineering Sciences is **Dr. R. H. Golde,** deputy chief engineer (Surges Section) of the Electrical Research Association. In the course of his visit he gave a lecture on lightning problems and had discussions at the Swedish State Power Board, the Post Office and the A.S.E.A. works at Vesteras and Ludvika.

Retiring after 50 years' service with J. H. Tucker and Co. Ltd., **Mr. George F. Wilson,** warehouse foreman, was entertained to a social last Friday by his directors and colleagues. To mark the occasion, presentations of a gold watch from the directors, and an electric standard lamp, fire and kettle from the staff and works personnel, were made by **Mr. J. B. Tucker,** managing director, and **Mr. D. R. Bailey,** progress manager (who also has over 30 years' service with the firm to his credit). Mr. Wilson joined the firm under the founder, the late Mr. J. H. Tucker, when it was Tuckers Electric Lighting Accessories Co. (perpetuated in their "Telac" trade mark) at Sampson Road North. The growth of the business necessitated subsequent removal to larger premises on to the present site at Tyseley in 1907 when this busy industrial area was mainly rural in character.



Mr. J. B. Tucker, left, presenting the gold watch to Mr. G. F. Wilson

We hear that **Mr. Eric W. Brades** has been appointed a director and sales manager of the newly formed Stella Radio and Television Co. Ltd. Mr. Brades has had 21 years' service with Philips Electrical Ltd., during which time he has been continuously engaged on radio industry activity.

Mr. Eric W. Brades

At present on the staff of the Belfast Post Office Telephone Department, **Mr. W. S. Cowie,** B.SC.(ENG.), is shortly to take up the position of assistant controller of telecommunications (engineering) in the Department of Posts and Telegraphs, Malaya.

A few days ago **Mr. Johan Wetlesen,** B.SC., managing director of the Backer Electric Co. Ltd., sailed for Canada to undertake special development work for Mr. C. B. Backer. Mr. Wetlesen received his training in Norway, taking his degree at Trondheim University. Before joining Mr. Backer in Ottawa in 1933, he spent several years with the Hydro-Electric Power Commission of Ontario. In 1938 he came to this country to build and equip the Backer Electric Co.'s factory at Rotherham, Yorkshire, where he was employed as manager and later as managing director. Before sailing, Mr. Wetlesen was presented with a gold wristlet watch and a pair of antique Sheffield plate cake baskets by the staff and employees of the company.

Mr. Johan Wetlesen

Owing to ill health **Mr. Frank Lonsdale** has resigned his position as general manager of Fraser and Chalmers Engineering Works, of the General Electric Co. Ltd., Erith. Mr. Lonsdale joined the company in 1909 and, after a period in the turbine section, was appointed chief draughtsman and subsequently manager of the turbine contracts department and drawing office. In 1918 when the firm was absorbed by the General Electric Co. Ltd., he became sales manager, and on the death of Mr. Ernest Wilson in 1938 was appointed general manager. A director of the General Electric Co. Ltd., since 1946, he will remain a member of the Board and continue to act in an advisory capacity at Erith.

OBITUARY

Mr. H. F. Reason, for many years an executive director of the Reason Manufacturing Co., Ltd., died on April 4, aged 76. Apart from a 5 years'

apprenticeship at the works of the old London, Brighton and South Coast Railway Co., and a short period as a shift engineer at the Electricity Works in Cork, he spent all his extremely active life with the Reason Co. He did, in fact, play an important part in the development of the famous business inaugurated by his brother, the late Mr. Henry Reason.

Lt.-Col. J. F. Young, D.S.O., managing director of Ekco-Ensign Electric Ltd., died on April 11. From 1931 until the outbreak, of war Mr. Young was London area manager of Ensign Lamps Ltd. With the acquisition of that concern by Ekco, he was appointed general sales manager of the Lighting Division of E. K. Cole Ltd., after his war service. He became managing director of Ekco-Ensign Electric in 1947. During the war he served with the R.A., and was awarded the D.S.O., the Order of Leopold of Belgium and the Croix de Guerre. Prior to the war, Lt.-Col. Young was an active member of the Honourable Artillery Company.

Lt.-Col. J. F. Young

Mr. T. G. Frost, M.I.E.E., for the past thirteen years London sales manager of Chamberlain and Hookham Ltd. died on April 12, aged 60. He had been connected with the electric meter industry for the whole of his business life, having joined Chamberlain and Hookham in 1908. He later became the company's representative for London and the Home Counties, a position to which he returned in 1919 after service in the 1914-18 war.

WILLS.—Mr. J. R. J. Bowden, A.C.G.I., A.M.Inst.C.E., A.M.I.E.E., a former deputy borough electrical engineer of Hackney, left £3,401 gross (£3,351 net value).

Mr. F. F. Robinson, M.I.E.E., a former senior technical officer with the London County Council, left £6,183 (£6,115 net value).

Mr. F. C. Polden, C.C., M.I.E.E., M.I.Mech.E., managing director of Francis Polden and Co., Ltd., left £14,132 gross (£12,620 net value).

Dr. H. R. Wright, chairman and managing director of Siemens Brothers and Co., Ltd., etc., left £201,339 gross (£191,091 net value).

Industry and the "Supers"

NEVER had it been so necessary to wish success to the electrical industry as in the present difficult times, said SIR STANLEY ANGWYN, in proposing the toast of "The Electrical Industry" at the annual dinner of the Association of Supervising Electrical Engineers, last Friday.

We must, he said, realise the problems before industry in general, and the electrical industry in particular, faced as it was with the necessity of grafting a defence programme on to the domestic requirements plus the export drive, with an acute shortage of raw materials. He had no doubt that the industry would rise to the problems—given team work, and the A.S.E.E. had a great part to play since their objects were those necessary for recovery, and their high tenets the very qualities so necessary for today. Their most notable achievement, he considered, was what they had done towards the stimulation of craft apprenticeship. Speaking as an old Whitworth Exhibitioner, he had never regretted the days spent in the shops, which he regarded as most necessary.

Replying to the toast, SIR ARCHIBALD GILL (President, I.E.E.), said that he also had served an apprenticeship—although he could show no missing fingertips to prove it. He referred to the difficulties facing both manufacturing and supply sides of the industry—manufacturers being hampered by lack of raw materials and the operating side by restrictions on capital expenditure. Electrical plant production had increased 50% in the last three years and in some directions even more striking advances had been made. Britain was now the world's leading exporter of radio components, production having increased five-fold, and exports twelve-fold in the last five years.

As president of the I.E.E., he paid tribute to the co-operation of the A.S.E.E. on various committees set up by the I.E.E. and B.S.I. The I.E.E. had recently been exploring means whereby the electrical technician could be given help to improve his qualifications. One direction was the setting-up of an association for these members of the industry.

Proposing the toast of "Our Guests," MR. T. G. N. HALDANE (President A.S.E.E.), emphasised the importance of the technician in the electrical industry and the need to cater for his specialised requirements. The A.S.E.E. was in a position to deal with the whole urgent problem of the technician and prepared to extend its scope and influence as necessary. In reply, SIR HAROLD HARTLEY acknowledged the work which the A.S.E.E. had done by lectures and discussions and attention to the human side which counted so much.

A notable event of the evening was the presentation of a silver salver to PROFESSOR R. O. KAPP, in appreciation of his services as examiner-in-chief for the past five years. Professor Kapp, in reply paid tribute to the work of MR. A. BRAMMER who has been the General Secretary of the Association for so many years.

Electricity Supply Prospects

Sir John Hacking Reviews the Supply Industry's Position at the R.S.A.

EVOLUTION of the supply industry, its present position and future prospects were reviewed at the Royal Society of Arts yesterday in the Llewellyn B. Atkinson lecture given by Sir John Hacking (Deputy Chairman, B.E.A.).

Reviewing the gradual integration of the supply industry, which has been in process since 1919, Sir John pointed out the appreciable economies which had been made possible by nationalisation in connection with reinforcement of the transmission system and the provision of new points of supply on the main transmission network. The adoption of the most economical scheme from the national point of view—irrespective whether the major cost falls on the Area Board or Central Authority—had, it was estimated, resulted in savings averaging £1½ million a year.

The Peak Load

The question of peak load shortages was considered from two aspects, the increase in consumption (more than twice pre-war) and the shortage of generating plant. Figures of actual consumption by various classes of consumers were compared with estimated contribution towards the peak (Table I), and the desirability of increasing the industrial load to the American scale of industrial electrification was stressed.

Table I. Consumer Analysis

Type of Consumer	Consumption kWhM	Percentage of total	Estimated Contribution to peak (%)
Industrial ...	20,784	50·1	46
Commercial	5,072	12·2	15
Domestic ...	13,460	32·5	35
Farm	372	0·9	
Traction Rail	885	2·1	4
Street	546	1·3	
Public lighting	360	0·9	—

Referring to plant shortages, the reasons were briefly explained, and an account given of the steps taken to speed up the increase of generating capacity. Standardisation of station layouts, machine ratings and steam conditions, central allocation of orders, and the steps taken to secure increased availability of items such as boilers and pipework were amongst the measures reviewed, together with the B.E.A.'s assumption of responsibility for planning and progressing new plant construction, in place of the Ministry of Supply and the Ministry of Works. These efforts had resulted in acceleration of the supply of new plant from 307 MW in 1946 to 965 MW in 1959.

Future Prospects

In spite of the increase in generating capacity, the load had year by year grown more swiftly, although it was probable that a point of balance had been reached, so that, although the present deficit of 2,000 MW was the most serious the country had ever known, the future outlook was more promising providing the B.E.A. could hold to its steadily expanding programmes. There were, however, he warned his audience, substantial difficulties in the way of this, amongst which were the protracted negotiations required before consent to a new station could be obtained.

More serious still was the matter of finance. The amount required for new generating plant—as much as £100 million a year—represented an appreciable proportion of the national total available capital, and re-armament, housing, industry and social services all had their claims, although he would regard adequate electricity supplies as the key to productivity and re-armament.

Coal supplies provided another great problem. Thermal efficiency, some 17·2% in 1932, had improved (after a falling off during the war) to 21·5% average, best individual stations being 28-29%, and the importance could be judged from the fact that an increase of 0·1% in average thermal efficiency represented a saving of 140,000 tons/year. Coal consumption already exceeded 30 million tons/year and an increase in industrial electrification to the American scale would need another 40 million tons/year, so that future coal supplies would be a matter of vital concern.

Regarding the probable duration of the present power shortage, Sir John pointed out that it was extremely difficult to prophesy the additional capacity which would be available each year and the difficulties of load forecasting five years ahead could be imagined. Figures were given (Table 2) of estimated rate of commissioning new plant,

Table 2. Estimated Rate of New Plant Commissioning

Year	Plant installed (MW)
1951	1,000/1,250
1952	1,150/1,400
1953	1,300/1,500
1954	1,400/1,600
1955	1,500/1,700
1956 onwards	1,600/1,800

the lower of each "band" being the amount which could be looked to with confidence, while the upper represented that which should be possible if the steps already taken proved as effective as hoped.

If the upper limit could be achieved, 1954 should see the load being met, but if it was not possible to achieve more than the minimum figures, or if the weather were exceptional, shortages would remain until 1958.

NEW LITERATURE

Rural Electrification Engineering

by Unus F. Earp

RURAL electrification is an essential element in economical farming by modern methods. This American book recognises this fact in that it is written for the professional agricultural engineer and prospective administrator. With its close concentration on U.S. practice it will have relatively little direct application in this country, but there is much common ground in the basic principles discussed.

An historical introduction to electricity supply generally and rural projects in particular introduces the volume, and a chapter on fundamental theory follows. After the general basis of rural systems has been described, methods and materials of line and substation construction are considered in detail. These matters occupy about half the book, the rest of which is devoted to utilisation problems, with descriptions of motors, switches and controls, heating appliances, and electronics. Financial considerations, organisation and administration are dealt with in a final section. Published by McGraw-Hill, 313 pp., 9 in. by 6 in. Price 30s.

Power Transmission Directory 1950-52

ESSENTIALLY for engineers and buyers of mechanical power transmission equipment, this eighth edition has been completely revised and enlarged, and now includes an electric motor section. In this, trade names and alphabetical and geographical lists of manufacturers and suppliers are given, with an indication of the type and size of motor handled. The remainder, and major part of the volume, is similarly arranged in respect of other mechanical power transmission equipment—the trade name section alone taking 68 pages. In addition brief data is given relating to belt drives and their overhaul. All works engineers, etc., will appreciate good value for money in this comprehensive buyers' guide. Published by Trade and Technical Press Ltd., 286 pages, 8⅝ in. by 6 in. Price 5s.

Matrix Analysis of Electric Networks

by P. Le Corbeiller

GABRIEL KRON'S methods of tensor analysis have found wide application by designers of rotating electrical machinery. In the volume under review, the professor of general educative and applied physics at Harvard University suggests a simple approach to tensors for engineers: he considers that Kron's own writings are unnecessarily complicated from the point of view of practical applications. The mathematics on which the approach is based, matrix algebra and topology, are briefly presented in the first chapter. The next describes Kron's mesh method, developing it to deal with various kinds of couplings. The so-called node pair method is then considered in a short third chapter, and the book ends with a final section on the methods of handling networks where external generators are concerned. Published by Chapman and Hall, 112 pages, 8½ in. by 5½ in. Price 24s.

Oil-filled Cable Installations

TECHNICAL information on all aspects of the design, installation and maintenance of oil-filled cables for voltages from 33 kV upwards, are given in this attractively produced handbook, now appearing in its second revision. A specially valuable feature is the list of all oil-filled cable installations in Britain and abroad, which is arranged in order of voltage and date of installation, and includes work at present in progress. With its table of current characteristics, losses, etc., this publication should be of value to all transmission engineers. Published by the Pirelli General Cable Works Ltd., Southampton, 211 pages, 7¼ in. by 4¾ in.

BOOKS RECEIVED

Practical Wireless Encyclopaedia by F. J. Camm. Published by Newnes, 360 pages, 8½ in. by 5½ in. Twelfth edition. Price 21s.

Electrical Engineers' Handbook—Electric Communication and Electronics, edited by H. Pender and K. McIlwain. Comprehensive American reference book. Published by Chapman and Hall, Fourth edition. Price 68s.

Time Bases by O. S. Puckle. Enlarged edition of standard text book. Published by Chapman and Hall. 378 pages, 8½ in. by 5½ in. Second edition. Price 30s.

Modern Fluorescent Lighting, by A. D. S. Atkinson. Principles and practice for engineers and architects. Published by Newnes. 159 pages, 8½ in. by 5½ in. Price 15s.

Use of Aluminium in Structural Engineering. Examples and technical details. Published by the Aluminium Development Association, 33 Grosvenor Street, London W.1. 43 pages, 11 in. by 8¼ in. Price 2s. 6d.

Redgrave's Factories, Truck and Shop Acts, by J. Thompson and H. R. Rogers. Supplement to seventeenth edition, taking it up to end of July 1950, with some later additions. Published by Butterworth and Co. (Publishers) Ltd. 137 pages, 6¾ in. by 4¾ in. Price 10s.

Standard Methods of Analysis of Iron, Steel and Ferro-alloys. Published by United Steel Companies Ltd., 17 Westbourne Road, Sheffield 10. 169 pages, 9 in. by 5¾ in. 4th edition. 17s. 6d.

Electrical Technology for Beginners by G. W. Stubbings. Elementary text book. Published by E. and F. N. Spon, 180 pages, 7¼ in. by 5 in. Third edition, price 9s.

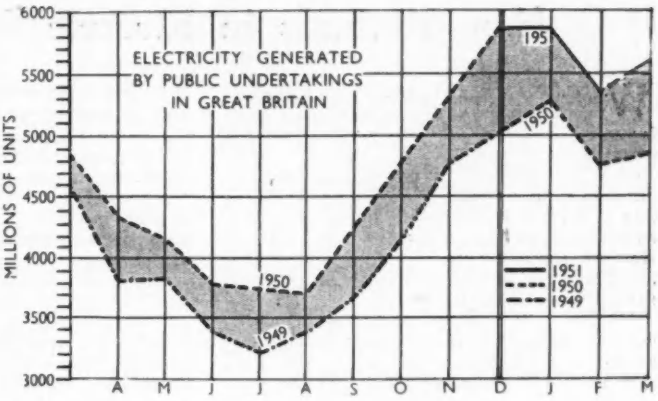
Power System Stability, Vol. 2, by E. W. Kimbark. Covers power circuit-breaker and relay considerations. Published by Chapman and Hall, 288 pages, 9 in. by 6 in. Price 64s.

UNITS GENERATED

5,550 million units was the total generated during March, 1951, in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 4,865 million, so there has been an increase of 14·1%.

Of the total, 5,396 million units were generated in steam stations, and 135 million in hydro-electric.

Energy sent out during the month was 5,247 million units, 94·5% of that generated. This gives the total for 1951 so far as 15,926 million units, an increase of 13·1% on the corresponding period of 1950.



POWER SUPPLY IN MARCH

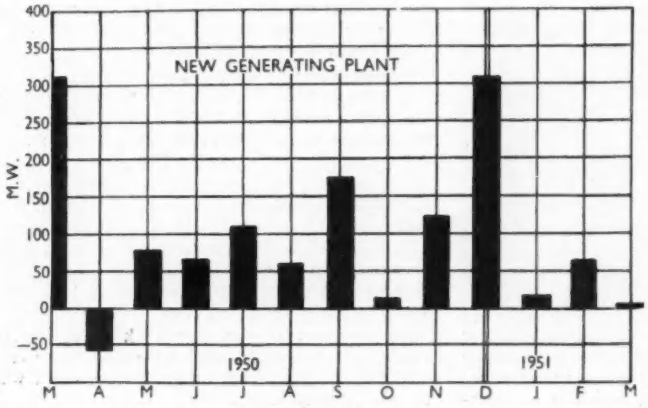
BOILERS are the main item in this month's list of newly installed plant in B.E.A. stations. The only set to appear is a 20 MW English Electric unit at Peterborough, in the Eastern Division. It is the first of two scheduled under present expansion plans, and is accompanied in this month's report by one of the three intended 160 klb/hr Babcock and Wilcox boilers.

The one new station to be noted in the list for the first time is Skelton Grange, at Leeds in the Yorkshire Division. Plant installation programmed up to 1954 includes one 550 klb/hr and six 360 klb/hr International Combustion boilers, and four 60 MW Parsons sets. The first boiler was completed during March.

Starting in the south of the country the first of the remaining four boilers was the second 300 klb/hr plant at Poole. In the East Midlands Division the completion of Staythorpe is proceeding and the sixth 240 klb/hr Babcock and Wilcox boiler has come into service, out of an intended total of 15.

At Sheffield, in the Yorkshire Division, planned extensions in the Neepsend station have been completed with the commissioning of the third 190 klb/hr Mitchell boiler. Finally, across the border at Glasgow (S.W. Scottish Division) comes Clyde's Mill, with the third of four 180 klb/hr Yarrow boilers.

These installations make the figures that will appear in the B.E.A.'s report for 1950/51 to 899 MW of new generating sets at m.c.r. and a total new evaporative capacity in steam boilers, of 10,925 klb/hr. Corresponding figures last year were 1,005 MW and 9,089 klb/hr.



GENERATING PLANT

At the end of March, 1950, the installed capacity of the B.E.A. was 14,639 MW, showing an increase of 5 MW during the month. In the same period, the North of Scotland total stayed unchanged at 529 MW. The figure for overall increase during the last twelve months thus drops to 958 MW, or 6·7%.

The total installed capacity for the purposes of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam and electric sides and are suitable for service.

D

New Methods in Electric Welding

WELDING technique has advanced rapidly in recent years, and its application in manufacturing industries has had much to do with increases in productivity. So, when Dr. H. G. TAYLOR delivered a lecture on "Modern Developments in Electric Welding" to the I.E.E. Utilisation Section on Thursday last, he was assured of an interested audience and meaty subject matter. He made the fullest use of both in a fully illustrated address which reviewed frontiers in the the advance of welding science.

He first dealt with the breakdown of electric welding into various departments, and then went on to state the objects pursued in developing methods—these including doing the job more quickly or more cheaply, and more reliably; this last taking the form of substituting automatic operation for dependance on the skill of the operator.

In metal arc welding an important development had been the production of electrode coatings containing little available hydrogen (present as water of crystallisation). These are used when there is rapid and considerable cooling of the weld metal, with consequent risk of cracking. Reliability can be increased if the operator can keep his electrode in contact with the work. and to allow of this electrodes have been developed with a conducting coating (it contains metal powder) which is kept pressed against the work metal.

After dealing with methods of balancing the welding load on three phases of a supply, Dr. Taylor went on to describe submerged arc welding, where a granular flux is poured on to the work from a hopper, just ahead of the welding electrode. More metal is melted by this method, and speed is much increased. Arc length is controlled by keeping the arc voltage drop constant by automatic means.

Argon arc welding is of importance in connection with the welding of light metals (aluminium and magnesium). A high-speed colour film illustrated most interestingly the arc phenomena involved here, and the troubles that arise from rectification due to the different thermionic emissivities of electrode and work metal. In a recent development, a wire electrode is fed through a gun, with the gas sprayed around it. No "man-made" control of arc length is necessary, as the rate of element burn-off increases rapidly as the arc voltage decreases. Direct current is necessary for this application.

Finally, in the lecture, some difficulties of resistance welding were considered. One of these is the inductance of the electrode "throat": if direct current is used, this becomes unimportant. Amongst methods suggested has been the use of magnesium/copper sulphide rectifiers on the low voltage side, working at some tens of thousands of amps. Such rectifiers are self healing, and work with fair efficiency at quite high temperatures.

Wired Television at Margate

MARGATE is somewhat unfortunately placed as far as television reception is concerned. Apart from being on the "fringe" of the Alexandra Palace service area, the town has a remarkably high level of general interference and also, what television signal is received, fluctuates over some 20 db.

In order to enable residents to receive a reasonable service, Rediffusion Services Ltd. have introduced "wired" television facilities available to subscribers together with three alternative sound programmes at an all-in cost of 7s. 6d. per week.

System Used

A sixty-five feet high aerial system consisting of twin folded dipoles with directors and reflectors has been erected on some comparatively high ground to the south of the town. This array gives an aerial gain of approximately 10 db. The received signal is passed to a low-noise amplifier of adequate bandwidth, followed by a frequency changer which converts the 45 Mc/s vision signal into an asymmetric side-band signal at an intermediate frequency. Automatic gain control circuits of special design take care of signal strength fluctuations. Sound is handled by a master sound receiver and routed to central control at Relay House for distribution on the existing network.

From the amplifier and frequency changer the vision signal is fed to a kiosk near the Tivoli Railway Bridge, Margate, where it is transferred to the cores of the main feeder cables which carry the existing radio programmes to subscribers.

The subscribers' terminal equipment consists of a cathode ray tube with its associated scanning and power supplies but shorn of most of the vision and all of the sound circuits associated with a normal set. These units are being built by an associated company—Radifon—who are also responsible for the manufacture of the main sound amplifiers.

At a press view, given last week, a demonstration of direct and "wired" reception was given, at which the great improvement in the latter was immediately apparent.

The BUYER'S *Column*

Another Burco Beauty

BOUQUET to BURCO LTD., Rose Grove, Burnley, on the announcement of their new No. 10 all-electric washing machine which we understand will be in production in May.

Burco's new No. 10 all-electric washing machine has style

Of orthodox design, this family size washer is built on cabinet lines and finished in cream or white enamel.

Dimensions of the machine are 25 in. × 23 in. × 47½ in. overall dimensions which allow the washing machine to fit snugly into most kitchens.

Pan, gearbox, motor, belt drive, etc., are suspensed as a single assembly. This is to be regarded as a typical Burco engineering feature.

Fitted with a power-driven Acme wringer which when in use clears a 36 in. sink, Burco's No. 10 will be available in limited quantities for the home market at a list price of £50 plus purchase tax. A porcelain table-top cover will be supplied as an extra when available.

E.A.C.'s Air Circuit-Breakers

SEVERAL interesting features are incorporated in the type A1 range of airbreak circuit breakers up to 600 volts a.c. just introduced by THE ELECTRICAL APPARATUS COMPANY LTD., of St. Albans.

The 300-amp. size now in production is ASTA certified as having a rupturing capacity of 15 MVA at 600 volts. Supplied normally in a standard type of industrial enclosure, the circuit-breakers are also available in flameproof and mining types, for either wall or floor fixing. An Interlocked Isolating Switch may be embodied and is strongly recommended. The breaker is of the mechanically operated type, with easily renewable heavy drop forged contacts.

Each pole of the circuit-breaker is fitted with a patented arc box consisting of a series of insulated magnetisable plates carried between non-inflammable arc chutes. When the circuit-breaker opens under load the arc reacts with the plates to set up a magnetic flux. This results in a blowout action which drives the arc between the plates where it is first split up into a number of arcs in series, and then extinguished rapidly due to the cooling action of the plates.

The overload releases are of the magnetic type and the settings extend to the limits specified in BSS. No. 862. Time lags of the oil dashpot inverse-ratio pattern are fitted to the overload releases, and the settings are adjustable.

The no-volt release is so designed as to ensure positive tripping with gradually falling voltage. Leakage protection is of the core-balance type and operates through a shunt trip coil.

Cold Junction Temperature Control

INDUSTRY and Research today require an extremely high degree of accuracy in measurement, in particular in the measurement of temperature changes. Consequently efficient cold junction temperature control is most desirable. Many methods of control are in existence, but the greater number have many disadvantages. With vacuum flasks there is the inconvenience of periodically re-charging the flasks whilst liquids are subject to slow temperature changes and stratification. Bimetallic compensators require

Efficient control of cold junction temperature is afforded by this Sunvic unit

This is Clang's Press-it-off Plug which we described in this column in last week's issue

the use of lengths of relatively expensive compensating cable.

The new type CJ1 thermostat introduced by SUNVIC CONTROLS LTD., 10 Essex Street, London W.C.2, provides an efficient constant temperature reference source for use with thermocouples. It is mains operated and will stabilise the cold junction temperature to more than 0·1° C. Basically the unit comprises a cylindrical aluminium body drilled to house the thermocouples and the thermometer, around which is wound a small heater controlled by a proportioning thermostat. The whole unit is enclosed in a bakelite cylinder and the control mechanism sealed.

Supplied set to a temperature between 42° C. and 48° C., the instrument will under normal conditions stabilise within 45 minutes of switching on, after which it maintains its temperature despite changes in ambient temperature or mains voltage.

Price Increases

OWING to increases in price of raw materials and manufacturing costs GEO. H. SCHOLES AND CO., LTD., Wylex Works, Wythenshawe, Manchester, have been compelled to advance list prices in Catalogue W868, with the exception of switch fuse control units by 10% as from April 9.

CARRON CO. of Carron, Stirlingshire, have also announced increases which have taken place in respect of their cookers, irons and breakfast cookers (all electric appliances). Literature and revised price lists are available on request.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, announces the following new prices for television receivers: Model BT.2147, receiver £37 13s. 7d., P.T. £16 18s. 5d.; Model BT.5144, receiver £49 19s. 11d., P.T. £22 9s. 1d.; Model BT.9144, receiver £134 11s. 3d. P.T. £60 8s. 9d.

WILKINS AND MITCHELL LTD., Darlaston, Staffs., announce increases in the prices of "Servis" washing machines as from Monday, April 16. The new list prices will be: "R" (round) model, £42 plus £22 18s. 0d.; and for the "MP" (cabinet model with pump as standard fitting) for export only, price is £55 0s. 0d. and £29 6s. 8d. (P. Tax).

"Twenty Questions" in the Showroom

"HELP your staff to help you" is the motto of the BURLTON INSTITUTE, 30 Manchester Street, London W.1, and the ever-popular quiz technique has been adopted (and adapted) to the training of salespeople.

While there will be few who cannot derive some benefit from the use of this form of training, it should appeal particularly to the smaller units where a major difficulty is the absence of a first-class lecturer. Using the methods outlined in the Burlton publications, it should be possible for any senior assistant to impart valuable knowledge in a slack half-hour obtaining more enthusiastic co-operation and making the knowledge acquired stick more tenaciously than is usually possible with a lecture programme.

Topics covered by the quiz series include policy, merchandise study, customer relationships, salesmanship, display, etc.; each topic being broken down into a number of standard quiz outlines, each covering the subject from a single aspect The Service and Salesmanship series, for example consists of some 38 separate outlines varying from "Welcome the Customer" to "Suggest Something Else," and a typical quiz, "Clinching the Sale" (No. 13), consisting of 25 questions dealing with matters from the psychological moment to stop showing merchandise to the importance of avoiding the appearance of undue haste. There are also several "Learn your Stock" booklets which will be found of considerable assistance to smartening-up the mental processes of the young salesman (or woman).

Showroom managers and retail dealers will find the leaflet "How to run a training scheme," gives valuable advice on the many problems involved.

The costs of the training schemes and material are equated to the size of the firm applying; smaller firms enjoying considerably reduced terms than say a large multiple store.

THE WEEK

COMMERCE *in news* INDUSTRY

P.T. Increase on Electrical Goods

THE effects of Mr. Gaitskell's budget speech, delivered after last week's issue had gone to Press, has been discussed at great length by everyone in Britain. Although only a week has passed since the announcements were made, other major international events have tended to push the Budget into the background, at least temporarily. Decisions on purchase tax have hit most manufacturers of domestic electrical appliances a cruel blow as the Chancellor has found it necessary to increase the tax on these commodities from 33⅓% to 66⅔%.

The increase covers domestic appliances operated by gas or electricity with the exception of clocks, sewing machines, hairdryers, lighting appliances, electric blankets, warming pads and bed-warmers. Main items which become chargeable at the new rate include: refrigerators, vacuum cleaners, floor polishers, washing machines, drying cabinets, ironers, ceiling and table fans, sun-ray lamps, radio and t.v. sets, food mixers.

Tariff Variations in S. Wales

UNIT charges below 3d. a unit are to be increased by one-tenth of a penny per unit in the S. Wales Area as a result of the variation in tariffs announced by the Board last week. The increases refer only to those charges which do not contain coal price clauses, and are to take effect as from the first meter reading after April 7. This follows similar announcements made by other Electricity Boards during recent months to offset the rising cost of fuel, increased wages for manual workers and a rise in the Central Authority's bulk supply tariff for 1951-52.

Lighted Shopwindows for Festival

THE restrictions on the use of electricity, gas, oil and candles for advertisement and shop-window lighting, have been lifted under the latest order issued by the Minister of Fuel and Power. The Advertisement Lighting (Prohibition) (Revocation) Order came into force as from the beginning of summer-time last Sunday. The news will be particularly welcomed because of the added brilliance which can now be achieved during the Festival months, and especially because many organisations which had planned floodlighting schemes will be able to go ahead with arrangements.

The story of economies throughout the past winter began last September when the Minister, foreseeing a shortage, banned the use of electricity for advertising during peak hours. As the winter progressed and fuel became even more scarce, it was deemed necessary to make further economies in order that adequate supplies were available for essential uses, and consequently the employment of electricity, gas, oil and candles for advertisement purposes was prohibited altogether. This order was made in January and was later extended to cover the period up to April 15.

Even better news than that contained in the revocation order is to be found in a letter from Mr. Alfred Robens, Parliamentary Secretary to the Ministry, addressed to the Sign Manufacturers' Association. The letter states that the reimposition of the ban on advertisement lighting next winter is extremely unlikely barring any unforeseen eventualities. The production of coal is expected to proceed satisfactorily during the summer and it is felt that restrictions during peak hours only will suffice to meet the winter demand.

Trade in the Caribbean Region

CLOSE proximity to the United States makes the markets of Panama and Costa Rica difficult territory for United Kingdom manufacturers, yet opportunities are arising, as the two latest Overseas Economic Surveys issued by the Board of Trade, reveals. Both of these countries are essentially agricultural, and exporting various commodities, but the demand for imported manufactured goods is increasing. In Panama, of all electrical machinery and apparatus, totalling over £3,000,000 in value imported in 1949, about 15% was for refrigerators alone. In all, however, the U.K.'s proportion of electrical goods amounted to £3,858 in value. A similar position applies in regard to Costa Rica. The report on that country refers also to proposals for the establishment of a new hydro-electric station by erecting a dam across the Raventazon River, which flows into the Atlantic. Copies of these reports are available from H.M. Stationery Office, price 1s. 3d. for Costa Rica, and 1s. 9d. for Panama.

Irishmen's Rise

ELECTRICIANS in Eire are to get an increase in pay of 5½d. an hour, bringing their rate up to 3s. 8½d. an hour. This rise is made up of an

The First Half-Century

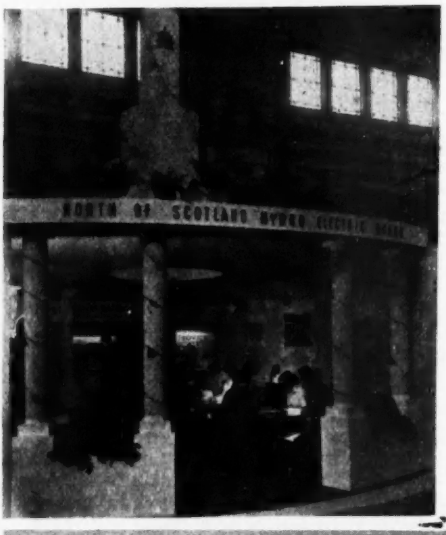
Wanted—a small alternator twenty-five to thirty kilowatts, belt or rope driven, frequency about 83. Machinery to be safe when run to give 100 cycles. Particulars, stating type of machine etc., to Box 250.—*From our issue of April* 18, 1901.

increase of 4d. an hour, plus the restoration of 1½d. per hour differential in rate which had applied to the electricians as compared with other craftsmen. Members of the Irish Engineering, Industrial and Electrical Trades Union last week accepted the offer of the Eire Electricity Supply Board and the Electrical Contractors' Association, thus ending the dispute in which the E.T.U. had served strike notice on the E.S.B. and the E.C.A. Earlier the electricians had put forward a claim for an increase of 9d. an hour.

Festival Electric

THE largest electrical exhibition ever to be held in Scotland—Festival Electric—was opened at Dundee by Mrs. Richard Fenton, the city's Lady Provost, last week. It was the N. of Scotland Hydro-Electric Board's contribution to the Festival of Britain, and as stated briefly in our issue of March 22, over 40 of Britain's electrical manufacturers took part with more than 3,000 exhibits displayed. It seems a pity that the exhibition was open for only five days and so missed the Festival proper. Unlike the Board's previous exhibitions, this one was designed to be of educational value by showing the public not only domestic appliances but also the engineering activities which are behind the scenes to the ordinary consumer. The latter was particularly emphasised at the opening ceremony when Mrs. Fenton pressed a button to set in motion a 64-ft stage model of the Pitlochry hydro-electric scheme. Water rushed over the dam spillways, and added realism was achieved by the recorded roar of the actual turbines. At the same time lights came on in the power station, followed by the hall and stand lights, as though the electricity supply had come from the model. The model itself, with its fir trees, ferns, moss and heather was lit by coloured fluorescent and spot lights.

A number of exhibits were making their first appearance in Scotland. Simplex Electric's "Comet" cooker was one such appliance, and the Venner washing machine timer, shown among an impressive array of spring and motor driven, and electrically wound, time switches. Other exhibits getting their Scottish "premier" included the "Servis" de luxe washing machine (export only) and the Hobart gravity feed slicer. Many of the exhibits will be displayed in Scotland again at the Exhibition of Industrial Power which is to open at the Kelvin Hall, Glasgow, on May 28. Official attendance figures for the whole exhibition are not yet available, but it is known that over 10,000 visitors entered the hall on the first day.



Industrial Safety

BELIEVED to be the first large-scale exhibition of its kind to which the factory worker will be invited in addition to works directors and factory supervisors, the Industrial Safety Exhibition is to be held in the Bingley Hall, Birmingham, from May 30 to June 2. It is being organised by the Birmingham and District Industrial Safety Group, who will be showing ideas they have developed and used in their own factories. Over fifty stands will be occupied by manufacturers of safety equipment including all kinds of machine guards, fire fighting appliances, and protective clothing. A temporary building will also be erected in the hall where a number of films are to be shown.

The opening ceremony at the Festival Electric exhibition in Dundee just after the Lady Provost had set a model of the Pitlochry hydro-electric scheme in motion. Above is the N. of Scotland H.E. Board's stand at the exhibition

Inquiry into Electricians' Dispute

FOLLOWING further discussions last week, the Minister of Labour decided to set up a Court of Inquiry into the eight-week-old strike of electricians employed by the London Electricity Board and other Boards, which involved about 2,000 electricians. This decision was announced by Mr. Bevan at a meeting of representatives of the parties involved. The Electrical Trades Union stated that an immediate return to work would be recommended. This course, the men agreed to at a meeting on Monday last. It will be recalled that the strike resulted from the action of an E.T.U. electrician at the London Board's Bethnal Green depot in refusing to work with a mate, just promoted, who belonged to the T. and G.W.U.

Radio and TV Sales Uncertain

CONSIDERABLE fluctuation in the sales of radio and television sets are likely to be found when comparing the monthly analyses between November 1950 and May 1951. Over Christmas an exceptionally high average was recorded, but this naturally dropped to more usual levels in the following month. The latest R.T.R.A. index (for February) shows that a new upward trend has begun, particularly concerning television sales, which rose from 9·79 to 12·12. Whether or not this trend continues following the Budget speech last week remains to be seen, but when the indices for this month and next are published, it will not be surprising if a substantial decline is recorded. The average number of sets sold per shop is as follows:

Month	1951	1950
Radio:		
January	12·29	11·94
February	12·75	11·89
Television:		
January	9·79	9·09
February	12·12	7·04

Five-day Course on Lighting

ONE of the most comprehensive courses on lighting is to open on Monday at the Lighting Service Bureau in London. During the five days of the course over twenty lectures will be given on various aspects of illumination and their sundry applications. A quick glance through the programme shows that the opening session is entitled "An appreciation of Artificial Lighting" and is to be followed by "Terms, Definitions and Units of Light." Three talks on "Design" have been scheduled for the afternoon. The engineering aspects of architectural lighting will be considered on Tuesday morning, the rest of the day being devoted to "Lamp Quality" and talks on incandescent, fluorescent and discharge lamps. On the third and fourth day lighting in the home, factories, shops, schools and offices have been included, together with floodlighting and colour. Other lectures on those days will be on "Maintenance and Lighting Economics," "Brightness

A view along the main road at Bletchley, the scene of a recent fluorescent street lighting scheme incorporating 37 Mazda lanterns, each of which contains three 5 ft 80 W lamps. All the equipment was supplied by British Thomson-Houston Co., Ltd., and work was carried out by the Staffordshire Constructional Co.

Engineering" and a review of modern lighting practice. Friday morning will be devoted to a talk on "E.L.M.A. and the L.S.B." and a general discussion. Fuller information concerning the times of individual lectures and the speakers is available at the Bureau at 2 Savoy Hill, W.C.2.

Scholarships in the U.S.A.

THE Ministry of Education has announced that 35 post-graduate scholarships are to be awarded in 1951 for the study of technology and management at selected universities or technological institutes and in industrial undertakings in the U.S. The awards, normally tenable for one year, will be open to students who hold good honours degrees in either Pure Science or Technology, who have had at least two years' industrial experience, and who are now working in industry or research associations or are teaching in universities or technical colleges. Full details may be obtained from the Ministry of Education.

"Arc Welding"

THE judgment of a documentary film must surely depend to a large extent on the successful achievement of its objects. If the film does the job it sets out to do it may be classed as a good film. Whether or not the established film critic bases his arguments on these lines is another matter, but under these circumstances the Quasi-Arc documentary "Arc Welding," shown publicly for the first time last Thursday, passes the test with honours.

With a running time of 20 minutes and printed in Technicolor, the film shows how a weld is made and the principles to be followed to ensure that sound welds can be produced. It also deals

with the equipment used, how operators are trained, the manufacture of electrodes, and the testing of finished welds. It was produced primarily for the trainee to initiate him in the applications of arc-welding and was intended as a background to further instructional courses, lectures and demonstrations. As such the film was excellent, and to the amateur film critic at least, the production was entirely satisfactory. Incidentally, the film was the first venture of its kind by Quasi-Arc, but plans are in hand for a second production on automatic welding.

Collier Orders Criticised

THE policy of the nationalised gas and electricity undertakings in building up their collier fleets was criticised at the annual meeting of the N. of England Shipowners' Association, held recently at Newcastle. While it was admitted that collier orders placed by these bodies had helped the shipyards, the private shipowners who had built up the coasting trade were being hampered and in some instances, driven out of business. The critic remarked that before nationalisation there was always enough shipping available to meet the needs of both these industries.

Jet Test Records by Radio

SOME interesting tests on jet turbine engines in flight have recently been undertaken by Rolls-Royce Ltd., at their development aerodrome at Hucknall, Nottinghamshire.

This has involved the strain testing of turbine blades. As far as is known this is the first time that such a test has been made whilst the engine is actually propelling an aircraft in flight. Resistance elements are built into the turbine blades and connections made to a radio transmitter in the aircraft by mercury slip-ring contacts. The signals are transmitted to the ground by radio, and recorded on magnetic tape which may be examined and analysed under laboratory conditions. Due to the impracticability of using a high-speed camera for a flight period of about three-quarters of an hour it was found that magnetic tape recording was the only suitable method for obtaining an accurate record of these signals which may include frequencies up to 20 kc/s, and a standard E.M.I. studio type tape recorder has been used by Rolls-Royce Ltd., for the purpose. The recorded signals are examined so that it can be determined at what speeds any dangerous strains occur and for this purpose a Muirhead-Pametrada wave analyser is used.

Lord Citrine signing the first apprenticeship agreement entered into by the B.E.A., watched by the recipient

Faulty Packaging

SOME facts and figures on the effect which faulty packaging due to paper shortage, had on Britain's war effort, were given by Mr. J. Freeman, parliamentary secretary to Ministry of Supply, speaking at a luncheon of the Waste Paper Recovery Association in London. Ninety per cent. of cathode ray tubes for radar landed on the Normandy beaches in 1944 were unserviceable. Mr. Freeman further disclosed that about 60% of accumulators and 40% of radios were unusable in non-European theatres of war for the same reason. Urging greater saving of waste paper he added that no one had calculated the number of lives which had been lost through deficiencies of that sort, but in those instances it must have been many thousands.

B.E.A. Apprentice Scheme

AN important ceremony took place at Penarth recently in which Lord Citrine and a young apprentice from the Tir John power station were the principal figures. Climax of the occasion was when Lord Citrine signed the first apprenticeship agreement which had been entered into between the B.E.A. and a craft apprentice under the Authority's new training scheme. Mr. B. C. Watson was the lucky apprentice, one of 22 who during the past eight months had been training at the Divisional Apprentice School set up at Penarth generating station in March 1950. This school aims at providing a basic training in electrical and mechanical engineering for between six and nine months, after which the boys are sent to power stations to undergo their craft training. Even after this initial period the boys' progress is carefully watched and they may in time be given a transfer to a student apprenticeship when they would be able to pursue a course to qualify as junior engineers.

A Forgotten Deposit

A NEWPORT (Mon.) baker, Mr. F. H. Taylor, who retired from business five years ago, recently received a cheque for £7 15s. 5d. from the S. Wales Electricity Board, which was due to him as a refund of a deposit paid on April 10, 1911. In that year Mr. Taylor was a young man of 25 working in his father's business. Electricity then came from Newport Corporation

The sales staff of Newman Industries Ltd., which gathered at the firm's head office at Yate, Bristol, recently for their Home Sales Conference. The picture includes Mr. A. J. Newman, managing director; Mr. Hedley Newman, assistant manging director and Mr. C. J. Hyde-Trutch, works director. Mr. A. J. Newman had only just returned from another successful trip to the Caribbeans and U.S.A.

but he could not recall what necessitated a three-guinea deposit. The sum refunded also included £4 12s. 5d. accrued interest.

At Your Leisure

TO CLOSE these columns this week we take a quick look at the social activities which have taken place in the industry recently. First of all we note two sporting occasions. B.T.H. have been honoured with a visit by the table tennis world champions Diane and Rosalinde Rowe who played exhibition matches on the finals night of the Willesden work's Table Tennis Section. Future champions in the making in another sport—boxing—provided an equally good evening's entertainment at Telcon's Greenwich works.

A notable function for contractors in the south west, was the annual dinner and ball of that section of E.C.A., which took place at Plymouth. Sales managers will probably be interested to learn that the Royal Counties branch of I.S.M.A. held its inaugural dinner recently. Sir Charles Colston, chairman of Hoover, Ltd., is the branch's founder-president.

News in Brief

The electrical machinery materials price index for March is 143·4, which shows a rise of 1·0% over the February index of 142.

The British Institute of Management has published a handbook of courses and examinations for the national scheme for diplomas and certificates in Management Studies. Copies may be obtained from the Institute at 8 Hill Street, W.1. Price is 6s. 3d.

Summer meeting of the Institute of Physics' Industrial Radiology Group will take place at Belgrave Square, S.W.1, between July 23 and 25.

The fourth annual conference of Incorporated Plant Engineers is to take place at Buxton between May 22 and 24.

Questions in Parliament

Electricity Industry's Expenditure

Capt. Duncan asked what allocations of capital to be spent in 1951-52 for the generation and distribution of electricity had been made to the North of Scotland Hydro-Electric Board and the B.E.A. Mr. Jay replied that as all civil investment programmes were being re-examined in the light of the higher defence programme, he was not yet in a position to give the information.

Domestic Heating

When asked the question of whether greater heating value is obtained by using a gas or an electric cooker, the Minister of Fuel and Power referred to an earlier answer in which it had been stated that the efficiency with which the potential heat of coal is delivered to a house as effective heat for warming a room was, in the form of gas, from 29 to 34%, and in electricity about 20%. There were, however, great variations in the efficiency of gas and electric cookers and in their use, therefore no precise quantitive comparison of their performance could be made. Concerning promotional campaigns by the boards, he pointed out that these had been stopped, but the replacement of old existing equipment could sometimes be useful.

Electricity Offices (Construction)

Asked why he had authorised the construction of offices by the B.E.A. and the Area Boards, Mr. Noel-Baker explained that the Authority and the boards had had to re-organise and integrate the staff of 561 undertakings. About 360 of these were municipal, the staff of many of which were previously housed in town halls or council offices which did not pass to the boards. Since vesting day, electricity sent out had increased by nearly 30% and half a million new consumers were connected each year. It was clear, therefore, that some construction and adaptation of office buildings had been required if the efficiency of the service was to be maintained. Since January 1, 1950, he had authorised the expenditure of only £400,000 on such new work.

Electric Supply News

Ashington (Northumberland)

The North Eastern Electricity Board has announced its intention to construct a 20 kV overhead line over the River Wansbeck near North Seaton colliery. The proposal awaits Ministry approval.

Cumberland

At the recent meeting of the West Cumberland Development Council it was stated that the Council was still hopeful that a new generating station would be established in the area.

Douglas (I.O.M.)

The Corporation Electricity Committee has approved the carrying out of a scheme, estimated to cost £21,150, for the extension and supplementation of the existing h.v. and l.v. mains network in the Onchan area and to facilitate the development of the Ballachrink estate by the Onchan commissioners.

Elland

Construction of a new generating station at Elland, which would serve the Halifax, Huddersfield, Bradford and Keighley region, is being contemplated by the Yorkshire Division of the B.E.A. Present plans, which as yet are only in the preliminary stage, are for a station of 120,000 kW capacity, composed of two 60,000 kW turbo-alternators. Construction would probably start in 1953, the station being commissioned about 1957. The site suggested at Elland is at Low Fields, on flat land adjoining the main Brighouse-Elland road. A main railway line runs across nearby, and the site is within a bend of the River Calder.

North Eastern

A report on the activities of the North Eastern Electricity Board for the period December to February, submitted to the Consultative Council, stated that estimates had been approved at £643,814 for 161 schemes, including 44 for housing and 40 for farms. During the period 102 substations were commissioned. One hundred and ten farms had been connected compared with 121 for the corresponding period of the previous year. Supplies were made available at six villages in the Tyne area, four in the Tees district, one at Harrogate and one at York. The report stated that negotiations were proceeding for supplies to farms, etc., along the 12 mile route of the Bellingham-Kielder extension. The report stated that to improve voltage conditions in the Stanley area it was proposed to spend £40,000. On three housing estates in the Sunderland area, a system of paying electricity bills on a weekly basis had been introduced. Details of the operating costs were being worked out to determine the extent to which this facility could be economically developed.

North of Scotland

A new scheme (No. 64), for the construction of a 3-phase overhead transmission line between Strathleven and Kepculloch, with the associated transforming stations, has been prepared by the North of Scotland Hydro-Electric Board.

The Board's plans for the construction of Lerwick generating station, have now been approved by the Secretary of State for Scotland, who has made the necessary confirming order.

Worcestershire

St. John's Parish Council has decided to support any action that might be taken by the Parish Councils' Association towards the removal of the outside-city surcharge imposed by the Electricity Board. Protest was made at having to pay 20% more than people in the towns.

LIGHTING SCHEMES

Ashby (Leics.).—The U.D.C. is to instal 30 fluorescent lamps in the town centre, sodium discharge lamps being utilised for the remainder of the main road lighting.

Banstead.—The U.D.C.'s street lighting extension scheme has been approved by the M.o.T.

Canterbury.—The city engineer is to collaborate with the South Eastern Electricity Board in the preparation of a scheme and estimate for raising the standard of street lighting generally in Sturry Road to that appropriate for a Class I road.

Castle Donington.—The Parish Council is considering proposals for changing street lighting from gas to electricity.

Lewisham.—The B.C. Works and Highways Committee has approved a 3-year programme for improving lighting in Class III roads, using discharge lamps, at a total cost of £10,500. M.o.T. approval is being sought to carry out the first step.

Maidenhead.—As the M.o.T. is considering a proposal to make the A.4 loopway (along Forleaze Road, York Road and Grenfell Road) a trunk road, a scheme has been prepared to light these to group A standard with mercury lamps.

Maidstone.—T.C. to submit to M.o.T. for approval a modified scheme for improving lighting between the Broadway and St. Michael's Road and Milton Street, and Farleigh Lane, at a cost of £2,170.

March.—The U.D.C. is to submit to the M.o.T full details of its proposed new street lighting scheme.

Rowley Regis.—The Council has approved a scheme for the substitution of electric lighting for gas lighting in High Street and Oldbury Road, Blackheath, at a cost of £2,869, using 3/80-W fluorescent lamps.

Solihull.—The Public Works Committee proposes that the borough surveyor should submit reports on improving the lighting in various roads.

Tavistock.—A comprehensive scheme for relighting the main streets and shopping centre of Tavistock is under consideration by the U.D.C. Highways and Lighting Committee.

Company Activities

Bakelite Ltd.

Reference to the research and development work undertaken was made by Mr. H. V. Potter, chairman and managing director, at this meeting recently. A special die has been produced and patented, which enables extruded p.v.c. sections of particularly high gloss to be produced, he said. New materials include a resin for use as a reinforcing filler in natural rubber compounds, and further developments in glass fibre laminates.

B.E.T Investments

For the year to March 1, investment income, etc., amounted to £34,470 (*£37,488*). After payment of tax £18,054 (*£19,580*), and dividend 3½% (*same*), there is £53,665 (*£53,419*) carried forward.

British Insulated Callenders' Cables Ltd.

Although the group trading profit for 1950, at £6,130,642, was £607,622 lower than the corresponding total for 1949, the directors have recommended increasing the final dividend on the £9,240,386 of Ordinary stock to 5½% (as against 4¾%), making a total for the year of 7½% (6¾%). Depreciation absorbs £781,899 (*£771,131*), interest £85,501 (*£85,738*), various provisions £185,279 (*£135,023*), taxation £2,945,201 (*£3,080,829*), leaving a net profit of £2,309,147 (*£2,881,797*) of which £2,070,438 (*£2,628,835*) is attributable to the holding company. It is generally considered that the increased final dividend indicates a confidence in the future, obviously based on the essential nature of the activities of the group.

Burma Electric Supply Co.

The directors propose a return of capital of 15s. for each £1 preference share. With the accounts for the year to July 31 last, the chief assets are listed as cash totalling £87,500 and investments at £26,500. Undischarged liabilities stood at £5,886. The directors report that it now appears impossible for the company to re-establish its business in Mandalay.

Crofts Engineers (Holdings) Ltd.

Group trading balance for 1950 is £722,080 as compared with £632,201 for the previous year. Fees and depreciation takes £65,778 (*£57,957*), and loss to minority holders £3,160 (*nil*), leaving a balance of £659,462 (*£574,244*). Group net assets are listed at £858,027 (*£747,434*).

Drayton Regulator Co. (Holdings)

Group profit for 1950, after allowing for all charges, including taxation, amounted to £63,951, an increase of £11,535 over the previous years' total. The U.K. tax charged is £87,859 (*£57,914*), interim dividend of 10% takes £4,125 (*nil*), the final dividend of 20% (*15%*), £8,250 (*£6,187*), bad debts reserve nil (*£1,500*), premium on shares account nil (*£1,665*), taxation expenses written off £4,071 (*nil*), leaving £50,158 (*£83,480, of which £78,351 not available for distribution*), carried forward.

McMichael Radio

For 1950, the profit on trading, etc., amounted to £62,793, compared with £52,383 for the previous year. The net profit, after charging fees, taxes, etc., is £19,650 (*£19,387*). The Participating Preferred Ordinary dividend takes £6,327 net (*same*), the 8% dividend on the Ordinary, £4,337 (*same*), to general reserve £10,000 (*same*), stock reserve nil (*£8,000*), leaving the sum of £11,051 carried forward.

Metropolitan Electric Cable and Construction Co.

For 1950, the net profit is £23,933, a decrease of £38,064 on the 1949 figure. Taxation takes £25,850 (*£52,000*), and there is a final Ordinary dividend of 5% making 15% (*both same*).

Mexican Light and Power

For the quarter ended December 31 last, gross operating revenue—in Canadian currency— was $5,889,390, with expenses, taxes and depreciation amounting to $5,014,266, leaving a net operating revenue of $875,124, and debt and construction loan charges of $420,422. For 1950, with an aggregate revenue of $22,603,770 ($*19,335,834*), the net operating revenue was $2,287,086 ($*1,274,877*).

Sturtevant Engineering Co. Ltd.

For 1950 the group profit is £488,166 (*£442,396*). The directors recommend a final dividend of 11%, tax free, making 16½% tax free, for the year, on the capital which was raised by a 20% share bonus. Taxation absorbs £271,214 (*£227,400*), leaving a net profit of £216,952 (*£214,996*). To general reserve £132,217 (*£153,285*), reserve for office extensions £30,000 (*nil*), leaving £85,957 (*£89,067*) carried forward, before deducting £9,025 capitalised by subsidiary.

West London and Provincial Electric and General Trust

Gross income for the year to March 31 was £55,892 (*£49,032*). There is a final Ordinary dividend of 5% (*same*) and bonus 2% (*nil*), making 9% for the year. Gross income includes £2,285 in excess of one year's income and special distributions. After charging management expenses, and debenture interest, gross, the profit is £38,800. Taxation absorbs £17,334 (*£14,839*), leaving £21,390 (*£18,961*). The sum of £5,000 (*£4,000*) is placed to general reserve and there is £10,209 (*£8,554*) carried forward.

Dividends Declared

Herbert Morris. Interim dividend of 5% (*same*), payable on May 11.

Ever Ready Trust. Final ordinary dividend 7%, making 12% (*11%*).

Commercial Information

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May 11. Sunderland. Electrical installation in Pennywell East primary junior and infants' schools. Architects, Wm. & T. R. Milburn, 17 Fawcett Street, Sunderland. Deposit £2 2s.

May 12.—Manchester. Electrical installation to, alterations and additions to, and reinstatement of electric lift at, the Lancastrian special school, Didsbury. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

May 25.—Belfast. Supply and erection of 33 kV 1,500 MVA open type indoor switchgear of the airblast or small oil volume type. Merz and McLellan, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See April 12 issue.)

No date stated.—N. of Scotland H.E. Board. Supply and erection of approx. 20 miles 33 kV overhead transmission line between Balthayock and Blairgowrie in Perthshire. Applications by April 20 to Kennedy and Donkin, 12 Caxton St., London S.W.1. Deposit £1 1s. (See April 12 issue.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

April 26.—S. Africa. Supply of E.H.T. and L.T. cable for City of Bloemfontein. Documents from City Electrical Engineer, 40 Elizabeth St., Bloemfontein.

April 30.—Morocco. Regie des Services de l'Eau et de L'electricite de la Zone de Tanger invite tenders for construction of overhead transmission line 22 kV to Cap Spartel, distance of approx. 9,500 metres. B.o.T. (Ref. CRE (IB) 57871/51).*

May 2.—Greece. Supply and installation of electrical equipment and accessories for Piraeus coal bridge. B.o.T. (Ref. CRE (IB) 58372/51).*

May 2.—Portuguese E. Africa. Permanent Purchasing Commission, Treasury Dept., Lourenco Marques require supply of sundry equipment including electric oven for 1,000° 220 V; one alternator dynamo set of 16 kW; two motor generator sets of 2·C5V with direct coupling. B.o.T. (Ref. CRE (IB) 58028/51).*

May 5.—Greece. Numerous commodities required by Ministry of Agriculture include three control and operating cabinets for generating sets of 80 kVA 220/380 V; three distribution switchboards for same; underground cables. B.o.T. (Ref. CRE (IB) 57612/51).*

May 15.—Wellington (N.Z.). Supply of six wind-driven generators to charge 24 lead-acid secondary cells at rate of 10-15 A. Quotations of manufacturers' nearest standard voltage rating also considered. N.Z. Post Office (Stores Division), G.P.O., Wellington C.1.

May 21.—India. Supply of approx. 380 distribution and power transformers with capacities of between 25 and 100 kVA. Required by Superintending Engineer of Electrical Dept. of Government of Madras.

May 25.—S. Africa. Supply of EHT, HRC switchgear for City of Bloemfontein. Documents from City Electrical Engineer, 40 Elizabeth St., Bloemfontein.

May 30.—S. Africa. Kimberley Municipal Authorities invite tenders for supply of four 11/5 kV interconnector transformers. Documents from Merz and McLellan (S. Africa), 1419 Escom House, Rissik St., Johannesburg. Deposit £2.

June 26.—Brisbane. 225 tons of bare copper cable of various dimensions for City Council. Tenders to Town Clerk.

July 2.—Queensland. Manufacture, supply and delivery of electric motors, motor starters and control equipment for 13 sluice gate winches at Somerset Dam. Plans on view at Office of Agent General for Queensland, 409 Strand, W.C.2, and copies from Chief Engineer, Dept. of Public Works, Brisbane. Deposit £1. (Advertised in this issue.)

July 13.—Uruguay. Supply of three radio - telegraphic - telephonic transmitters with outlet power on carrier of 250 W, for Direccion General de Comunicaciones (Servicio de Transmissiones). B.o.T. (Ref. CRE (IB) 57434/51).*

CONTRACTS PLACED

B.E.A. Orders placed recently for generating plant for power stations, amounting to £21,500,000, comprise: One 30 MW turbo-alternator, condensing and feed heating plant, Acton Lane, B, Richardsons Westgarth Co., Ltd.; one 100 MW turbo-alternator, Battersea B, and two 52,500 kW turbo-alternators, condensing and feed heating plants and transformers, Brunswick Wharf, Metropolitan Vickers Co.; one 60 MW turbo-alternator, condensing and feed heating plants, Fulham, English Electric Co. Ltd.; two 30 MW turbo - alternators, condensing and feed heating plant, Hackney, C. A. Parsons and Co. Ltd.; one 30 MW turbo-alternator and ancillary equipment, Woolwich, G.E.C. Ltd.; two 30 MW turbo-alternators, feed heating plant and step-up transformers, East Yelland, C. A. Parsons and Co., and two 30 MW condensing plants for same, G. & J. Weir, Ltd.; two 60 MW turbo-alternators, condensing and feed heating plant, Portishead B, Metropolitan-Vickers Co. Ltd.; one 60 MW turbo-alternator, condensing and feed heating plant, Brimsdown, Richardsons Westgarth and Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plants, Goldington, British Thomson-Houston Co. Ltd.; same for Rye House, Richardsons Westgarth and Co. Ltd.; three 60 MW turbo-alternators, condensing and feed heating plants, Tilbury, English Electric Co. Ltd.; one 30 MW turbo-alternator, and ancillary plant, Northampton, C. A. Parsons and Co. Ltd.; two 60 MW turbo-alternators, condensing and feed heating plant, Drakelow, English Electric Co. Ltd.; three 60 MW turbo-alternators, Meaford B, B.T-H.; one 60 MW turbo-alternator, condensing and feed heating plant, Stourport B, English Electric Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plants, Walsall, B.T-H.; six 60 MW turbo-alternators, condensing and feed heating plant and transformers, Uskmouth, G.E.C. Ltd.; two 30 MW turbo-alternators, Bold, and one 51,500 kW turbo-alternator, condensing and feed heating plant for Clarence Dock, Metropolitan-Vickers Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plant, Doncaster, also one 30 MW turbo-alternator, condensing and feed heating plant and one 30 MW turbo-alternator for Huddersfield, G.E.C. Ltd.; one 60 MW turbo-alternator, feed heating plant, N. Tees, C. A. Parsons and Co. Ltd.; one 40 MW turbo-alternator, condensing and feed heating plant, Blackburn, English Electric Co. Ltd.; three 60 MW turbo-alternators, condensing and feed heating plant, Carrington and

Your Queries — Answered

Fluorescent powders, producers of? G.N.—Derby and Co. Ltd., 62/63 Cheapside, E.C.2; Lumifax Ltd., Wembley Hill Estate, Wembley. (19942)

Soldering tool on which a note appeared in the October 12, 1950 issue, suppliers of? V.L. — Easysold Ltd., 54 Acton Lane, London W.4. (19951)

"Hotway" automatic geysers, makers of? A.P.—Campbell Eng. Co. Ltd., Sherman Works, Sherman Rd., Bromley, Kent. (19956)

"Lectross" clothes horse, makers of? T.E.—These were made by John A. Grey and Partners Ltd., Piccadilly House, Piccadilly Circus, S.W.1., a firm which went out of business last year. The firm Electronic Precision Equipment, Electron House, Ruislip Manor, Middx., have advertised this appliance. (19962)

"Thermoheat" blankets, producers of? C.D.—Sound, 683 Barlow Moor Rd., Manchester 21. (19969)

"Hill Porter" irons, makers of? W.P.—Hill Porter (Newcastle) Ltd., Eldon Sq., Newcastle-on-Tyne. (19976)

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May 11. Sunderland. Electrical installation in Pennywell East primary junior and infants' schools. Architects, Wm. & T. R. Milburn, 17 Fawcett Street, Sunderland. Deposit £2 2s.

May 12.—Manchester. Electrical installation to, alterations and additions to, and reinstatement of electric lift at, the Lancastrian special school, Didsbury. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

May 25.—Belfast. Supply and erection of 33 kV 1,500 MVA open type indoor switchgear of the airblast or small oil volume type. Merz and McLellan, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See April 12 issue.)

No date stated.—N. of Scotland H.E. Board. Supply and erection of approx. 20 miles 33 kV overhead transmission line between Balthayock and Blairgowrie in Perthshire. Applications by April 20 to Kennedy and Donkin, 12 Caxton St., London S.W.1. Deposit £1 1s. (See April 12 issue.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

April 26.—S. Africa. Supply of E.H.T. and L.T. cable for City of Bloemfontein. Documents from City Electrical Engineer, 40 Elizabeth St., Bloemfontein.

April 30.—Morocco. Regie des Services de l'Eau et de L'electricite de la Zone de Tanger invite tenders for construction of overhead transmission line 22 kV to Cap Spartel, distance of approx. 9,500 metres. B.o.T. (Ref. CRE (IB) 57871/51).*

May 2.—Greece. Supply and installation of electrical equipment and accessories for Piraeus coal bridge. B.o.T. (Ref. CRE (IB) 58372/51).*

May 2.—Portuguese E. Africa. Permanent Purchasing Commission, Treasury Dept., Lourenco Marques require supply of sundry equipment including electric oven for 1,000° 220 V; one alternator dynamo set of 16 kW; two motor generator sets of 2·C5V with direct coupling. B.o.T. (Ref. CRE (IB) 58028/51).*

May 5.—Greece. Numerous commodities required by Ministry of Agriculture include three control and operating cabinets for generating sets of 80 kVA 220/380 V; three distribution switchboards for same; underground cables. B.o.T. (Ref. CRE (IB) 57612/51).*

May 15.—Wellington (N.Z.). Supply of six wind-driven generators to charge 24 lead-acid secondary cells at rate of 10-15 A. Quotations of manufacturers' nearest standard voltage rating also considered. N.Z. Post Office (Stores Division), G.P.O., Wellington C.1.

May 21.—India. Supply of approx. 380 distribution and power transformers with capacities of between 25 and 100 kVA. Required by Superintending Engineer of Electrical Dept. of Government of Madras.

May 25.—S. Africa. Supply of EHT, HRC switchgear for City of Bloemfontein. Documents from City Electrical Engineer, 40 Elizabeth St., Bloemfontein.

May 30.—S. Africa. Kimberley Municipal Authorities invite tenders for supply of four 11/5 kV interconnector transformers. Documents from Merz and McLellan (S. Africa), 1419 Escom House, Rissik St., Johannesburg. Deposit £2.

June 26.—Brisbane. 225 tons of bare copper cable of various dimensions for City Council. Tenders to Town Clerk.

July 2.—Queensland. Manufacture, supply and delivery of electric motors, motor starters and control equipment for 13 sluice gate winches at Somerset Dam. Plans on view at Office of Agent General for Queensland, 409 Strand, W.C.2, and copies from Chief Engineer, Dept. of Public Works, Brisbane. Deposit £1. (Advertised in this issue.)

July 13.—Uruguay. Supply of three radio - telegraphic - telephonic transmitters with outlet power on carrier of 250 W, for Direccion General de Comunicaciones (Servicio de Transmissiones). B.o.T. (Ref. CRE (IB) 57434/51).*

CONTRACTS PLACED

B.E.A. Orders placed recently for generating plant for power stations, amounting to £21,500,000, comprise: One 30 MW turbo-alternator, condensing and feed heating plant, Acton Lane, B, Richardsons Westgarth Co., Ltd.; one 100 MW turbo-alternator, Battersea B, and two 52,500 kW turbo-alternators, condensing and feed heating plants and transformers, Brunswick Wharf, Metropolitan Vickers Co.; one 60 MW turbo-alternator, condensing and feed heating plants, Fulham, English Electric Co. Ltd.; two 30 MW turbo - alternators, condensing and feed heating plant, Hackney, C. A. Parsons and Co. Ltd.; one 30 MW turbo-alternator and ancillary equipment, Woolwich, G.E.C. Ltd.; two 30 MW turbo-alternators, feed heating plant and step-up transformers, East Yelland, C. A. Parsons and Co., and two 30 MW condensing plants for same, G. & J. Weir, Ltd.; two 60 MW turbo-alternators, condensing and feed heating plant, Portishead B, Metropolitan-Vickers Co. Ltd.; one 60 MW turbo-alternator, condensing and feed heating plant, Brimsdown, Richardsons Westgarth and Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plants, Goldington, British Thomson-Houston Co. Ltd.; same for Rye House, Richardsons Westgarth and Co. Ltd.; three 60 MW turbo-alternators, condensing and feed heating plants, Tilbury, English Electric Co. Ltd.; one 30 MW turbo-alternator, and ancillary plant, Northampton, C. A. Parsons and Co. Ltd.; two 60 MW turbo-alternators, condensing and feed heating plant, Drakelow, English Electric Co. Ltd.; three 60 MW turbo-alternators, Meaford B, B.T-H.; one 60 MW turbo-alternator, condensing and feed heating plant, Stourport B, English Electric Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plants, Walsall, B.T-H.; six 60 MW turbo-alternators, condensing and feed heating plant and transformers, Uskmouth, G.E.C. Ltd.; two 30 MW turbo-alternators, Bold, and one 51,500 kW turbo-alternator, condensing and feed heating plant for Clarence Dock, Metropolitan-Vickers Co. Ltd.; two 30 MW turbo-alternators, condensing and feed heating plant, Doncaster, also one 30 MW turbo-alternator, condensing and feed heating plant and one 30 MW turbo-alternator for Huddersfield, G.E.C. Ltd.; one 60 MW turbo-alternator, feed heating plant, N. Tees, C. A. Parsons and Co. Ltd.; one 40 MW turbo-alternator, condensing and feed heating plant, Blackburn, English Electric Co. Ltd.; three 60 MW turbo-alternators, condensing and feed heating plant, Carrington and

Your Queries — Answered

Fluorescent powders, producers of? G.N.—Derby and Co. Ltd., 62/63 Cheapside, E.C.2; Lumifax Ltd., Wembley Hill Estate, Wembley. (19942)

Soldering tool on which a note appeared in the October 12, 1950 issue, suppliers of? V.L. — Easysold Ltd., 54 Acton Lane, London W.4. (19951)

"Hotway" automatic geysers, makers of? A.P.—Campbell Eng. Co. Ltd., Sherman Works, Sherman Rd., Bromley, Kent. (19956)

"Lectross" clothes horse, makers of? T.E.—These were made by John A. Grey and Partners Ltd., Piccadilly House, Piccadilly Circus, S.W.1., a firm which went out of business last year. The firm Electronic Precision Equipment, Electron House, Ruislip Manor, Middx., have advertised this appliance. (19962)

"Thermoheat" blankets, producers of? C.D.—Sound, 683 Barlow Moor Rd., Manchester 21. (19969)

"Hill Porter" irons, makers of? W.P.—Hill Porter (Newcastle) Ltd., Eldon Sq., Newcastle-on-Tyne. (19976)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Chadderton stations, Metropolitan-Vickers Co. Ltd.; three 30 MW turbo-alternators, Fleetwood, English Electric Co. Ltd.; two 30 MW turbo-alternators, Huncoat, G.E.C. Ltd.; four of same for Roosecote, Metropolitan-Vickers Co. Ltd.; and one 60 MW turbo-alternator, condensing and feed heating plant, Portobello, Richardsons Westgarth and Co. Ltd.

Cheltenham T.C. Electrical installation in 70 houses on Hester's Way estate, Midlands Electricity Board, £2,195.

Plymouth. Supply and erection of (*a*) fluorescent street lighting in Armada Way, New George St., and Raleigh St.; and (*b*) mercury vapour in Buckwell St., G.E.C. Ltd., (*a*) £4,444 and (*b*) £1,200.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Carnival. 695,917. Class 9. Electrical apparatus and instruments; wireless and television receivers, etc. Ultra Electric Ltd., Ultra Works, Western Ave., Acton, W.3.

Fasco. 687,827. Class 9. Electric circuit breakers and switches. Fasco Industries Inc., North Union and Augusta Streets, Rochester, N.Y., U.S.A.

Filson. B695,314. Class 9. Apparatus and instruments for recording and reproducing sound. Trevor-Johnston Co., Ltd., 169 Sloane St., S.W.1.

Plimoseal. 696,068. Class 9. Capacitors. Telegraph Condenser Co., Ltd., Wales Farm Rd., North Acton, W.3.

TRADE NOTES

Holidays. The Telcon Works, Greenwich, and Frequency Works, Farnborough, Kent, of the Telegraph Construction and Maintenance Co. Ltd., will close for the annual holiday from July 20 to August 7.

Iceland Imports. An arrangement has been announced for the importation into Iceland of certain goods placed on a "conditional" free list. The goods include cookers, irons, coffee pots, water boilers, ironing, washing and mixing machines, refrigerators, vacuum cleaners, fans, electric clocks, lamps and fittings. But U.K. exporters are advised to obtain payment in advance or a guarantee that the foreign currency is available.

Works Extension. Clarkson (Engineers) Ltd., are building a large extension to their works in King Edward Rd., Nuneaton.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	210 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	223 10 0	—
Delivered in 4th, 5th and 6th month after order	225 0 0	—
LEAD, good soft pig (foreign)	160 0 0	136 0 0
,, ,, ,, "English" quality	161 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) ... ...(Cash)	1120-1125	—
,, (3 months)	1110-1115	—
ALUMINIUM, commercial purity (del.) ...	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	47 10 0	—
Mild Steel Tape (0.04 in.)	26 10 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Manchester. Ingham and Owen Ltd., electrical engineers and contractors, have appointed Arthur Tyldesley Eaves, 47 Mosley St., Manchester 2, as liquidator with committee of inspection.

Peerless Refrigeration Ltd., refrigerator manufacturers, of Park Lane, W.1. At first meeting of creditors the Official Receiver reported that winding-up order was made on Feb. 26.

No statement of affairs had been filed, but gross liabilities were stated to be about £102,000 Assets were estimated at £56,222 and in addition there was a shipment of refrigerator units invoiced at £2,350. Resolution passed for appointment of Mr. David Morgan, of 100, Park Street, W.1, as liquidator, with a committee of inspection.

Wyeside Welding and Electrical Co. Ltd. Meeting of members to be held at 6 Wilson's Chambers, Commercial St., Hereford, on May 16 at 11 a.m., to receive liquidators' report.

Voluntary Liquidation

Ernest B. Davis Ltd., electrical contractors of Ashton-in-Makerfield. At meeting of creditors statement of affairs showed liabilities of £8,911. Net assets estimated at £1,159, or deficiency of £7,753. Company was registered in Sept., 1948, with £3,000 capital, and took over existing business. Trading figures for first year showed net loss of £1,481 and in following year a further loss of £2,469. Resolution passed confirming voluntary liquidation. Mr. L. A. Pardey, 65 Gerard Street, Ashton-in-Makerfield, and Mr. S. O. Henry, 5 Romford Place, Chapel Street, Liverpool, appointed joint liquidators, with committee of inspection.

Ricketts and Hanson Ltd., electrical engineers and contractors, of Birmingham. At meeting of creditors a statement of affairs was presented showing liabilities to £1,341, of which £1,026 was due to trade creditors, and £314 to the Bank. Assets totalled £388 2s. 6d., leaving a deficiency as regarded creditors of £952. So far as the shareholders were concerned, there was a total deficiency of £1,952. Resolution passed confirming voluntary liquidation. Mr. A. V. Wilkinson, of Messrs Smith Wilkinson and Co., accountants, 4, Holloway Head, Birmingham was appointed liquidator, with a committee of inspection.

BANKRUPTCY ACTS

Application for Discharge

Birmingham. Frank Robinson, refrigerating and electrical engineer, at 100 Henshaw Rd., Small Heath, Birmingham Hearing fixed for June 6 at Court House, Corporation St., Birmingham 4, 10.15 a.m.

Appointment of Trustee

Birmingham. Richard H. Myers, electrical engineer, trading as "Myers and Son" at 169 Aston Rd., Birmingham 6. Trustee is R. F. Bendall, 126 Colmore Row, Birmingham.

Order on Application for Discharge

Salford. Charles John Baldwin, electrical fitter of 212 Barton Rd., Stretford. Bankrupt's discharge suspended for 7 days and that he be discharged as from Sept. 15, 1950. Relative to the above, C. J. Baldwin, the following amended notice has been substituted for those published in "London Gazette" on June 27 and July 21, 1950: First and final dividends of 5s. 7¼d. in £ payable at Official Receivers' Office, 20 Byrom St., Manchester, on April 24.

BUSINESS PROSPECTS

HOME

Ashby-de-la-Zouch U.D.C. 72 houses to be built on Moire Rd. site.

Aylesbury T.C. Approval sought for erection of 32 flats in eight blocks in Churchill Ave.

Barking. Approval granted to Chemical Supply Co. Ltd. to build a factory in Abbey Rd.

Basildon (Essex). Tenders shortly to be invited for erection of a factory for Nufloor Ltd., Hackney, E.9. Architects are Clifford Strange and Associates, 4 London Wall Buildings, E.C.2.

Battersea. Plans provisionally approved for erection of 230 flats in Battersea Park Rd. area.

Beddington and Wallington T.C. Erection of 28 bungalows in Richmond Rd. Applications to A. B. Bateman, Town Clerk, Town Hall, Wallington, Surrey.

Belfast. Approval received for erection of 130 houses at Glen Gormley.

Blandford. Salway Morgan and Co. Ltd. of West Quay Rd., Poole, planning to build a factory near Morden Lodge.

Bridgwater T.C. Erection of 54 houses at Montacute's Field. Borough Engineer, Town Hall.

Corby (Northants) U.D.C. Amended lay-out approved for erection of 483 houses on Lodge Park site.

Dudley T.C. Tenders to be invited for installation of electricity in 233 houses.

Eccles T.C. Erection of 28 houses on Ellesmere Park. Borough Engineer and Surveyor, Town Hall.

Enfield. Approval has been received for alterations to electric lighting installation at Technical College. Estimated cost is £1,155.

Esher (Surrey) U.D.C. It is proposed to build 36 flats, 26 houses and 4 homes for old people at Cobham.

Exeter T.C. Erection of 119 dwellings on Stoke Hill estate. City Architect is Harold B. Rowe, Municipal Offices.

Hampshire. It is proposed to erect two additional telephone exchanges at Upton Grey and Hartley Wintney.

Harrogate T.C. Plans approved for installation of vehicle-actuated traffic control signals in Victoria Ave.

Hendon. Construction of 48 flats in Kenilworth Rd. Office of Borough Engineer and Surveyor, Town Hall, N.W.4.

Hyde (Cheshire) T.C. Erection of 86 houses on Harbour Farm and Cheetham Fold estates. Borough Surveyor, Municipal Buildings.

Lewisham. Tenders to be invited for erection of 102 dwellings at Paragon Place. Plans by Prof. A. E. Richardson, and E. A. S. Houfe, Architects, 31 Old Burlington St., W.1.

London. Plans being prepared for erection of 13-storey office block in Queen Victoria St., E.C.4, at estimated cost of £8 million. Scheme being financed by Haleybridge Investment Trust (1947) Ltd., and Legal and General Assurance Ltd. Architects are Campbell-Jones and Sons, 9 Dowgate Hill, E.C.4.

Louth T.C. Erection of 32 houses on Eastfield Rd. estate. Council's Architects, Vallance and Westwick, White Hart Chambers, Mansfield.

Oldbury T.C. Erection of 92 houses on Brandhall estate. Borough Surveyor, Municipal Bank Chambers, Oldbury, Birmingham.

Portslade-by-Sea U.D.C. Erection of 40 houses at Mile Oak. Council's Architects, Geo. W. Warr and King, 137 Albion St., Southwick.

Seaton Valley U.D.C. Tenders being obtained for erection of 54 houses at Shiremoor. Surveyor, Council Offices, Seaton Delaval.

Skegness U.D.C. Council recommended to approve installation of traffic signals in Lumley Square.

Southall. Tenders likely to be invited soon for erection of junior and infants' schools at Top Locks. Estimated cost, £93,000.

Southsea. S.W. Metropolitan Regional Hospital Board plan to install a lift at Portsmouth Eye and Ear Hospital.

South Shields T.C. A total of 48 flats in four blocks is to be built in Wellington St. Borough Engineer is John Reid, Town Hall.

Staines (Middx.) U.D.C. Erection of 81 houses at Laleham. Engineer and Surveyor's Offices, Shortwood House, 240 London Road.

Sunderland T.C. Ministry of Food has approved construction of a £200,000 modern abattoir.

Tonbridge (Kent) R.D.C. Erection of 46 flats and houses on various sites. Engineer and Surveyor, 48 Pembury Road.

Tottenham. Construction of 28 flats on Cornwall Rd. estate. Borough Engineer, Town Hall, N.15.

Walton and Weybridge (Surrey) U.D.C. Plans approved for erection of 148 houses at Burwood Road.

West Sussex. Erection of secondary modern school at Horsham. Applications to County Architect, County Hall, Chichester.

Whitchurch (Salop) U.D.C. Construction of 36 flats on Sedgeford site. Frank Clayton, Clerk of the Council, Council Offices.

OVERSEAS

Canada. British Industrial Agencies, 360 Craig St. West, Montreal, want to purchase a large quantity of electrical friction tape and masking tape.

Hong Kong. Two firms on the island have expressed an interest in fluorescent lighting equipment. They are Messrs. Kwong, Ming and Co., Wang Hing Building, 10 Queens Rd. Central, and Messrs. Associated Trading and Development Co., Room 103, Victory House, Wyndham St.

U.S.A. Messrs. French-Van Breems Inc., 375 Fairfield Ave., Stamford, Connecticut, want to obtain direct factory representation for products normally sold to electrical wholesale trade, particularly cable grip pliers, sockets, switches, fuses, American type valves, television boosters and other t.v. components.

Also Messrs. W. W. Grainger Inc., 740 W. Adams St., Chicago 6, are anxious to secure supply of a wide range of electrical goods, especially motors, blowers and fans. Mr. Grainger, President, will be visiting this country shortly but interested firms are advised to open negotiations immediately.

West Indies. Mr. J. E. de Montbrun, director of Grell and Co., Ltd., 5a Chacon St., Port of Spain, Trinidad, is visiting the U.K. in immediate future to obtain agencies for electrical fittings and lamps and lanterns. Price lists and literature should be sent to the Commercial Relations and Exports Dept. of B.o.T.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Aspiration Ltd., 106 Regent St., W.1. Constructional air conditioning, ventilating, cooling, refrigerating and insulating engineers, etc. Cap.: £100. Dirs.: E. A. Merrick and Margaret Merrick, J. Williams and K. Michaelis.

Drake and Gorham (Contractors) Ltd. To take over business of electrical, mechanical and hydraulic engineering contractors carried on by Drake and Gorham, Ltd. Cap.: £150,000. Dirs.: to be appointed by subs. Subs.: For and on behalf of Drake and Gorham, Ltd., 36 Grosvenor Gardens, S.W.1. G. W. Leach.

H. Dunn (Electrical) Ltd. To acquire all or part of the business of H. Dunn and Son, builders, contractors and general engineers, electrical engineers manufacturers of wireless receivers, etc. Cap.: £2,000. Dirs.: H. S. Preston, 8 Ipswich Rd., Westbourne, Bournemouth; R. E. W. King, 6 Southway, Carshalton Beeches, Surrey; and H. A. Dunn.

E. and L. D. Lacey Ltd., 4 Ingate Place, Queenstown Rd., S.W.8. Mechanical, electrical and general engineers, laundry engineers, etc. Cap.: £200. Dirs.: E. Lacey and L. D. Lacey.

Electrical and Mechanical Trading Co. Ltd., 22 Upper Grosvenor St., W.1. Merchants, bankers, traders, etc. Cap.: £1,000. Dirs.: K. A. Jones and C. Metliss.

I. H. Electrical Co. Ltd., 3 Corona Bldgs, Swanley, Kent. To take over business of radio and television retailers carried on at Swanley as "Ideal Home Electrical Co." Cap. £5,000. Dirs.: L. A. Desmond and Mrs. P. M. Desmond.

John M. Foggo Ltd., Rockville, Cherry Orchard, Lichfield. To take over business of a general agent, mechanic, electrical and electronic engineer carried on at Lichfield by John M. Foggo. Cap.: £5,000. Dirs.: J. M. Foggo (permanent) and Mrs. I. H. Foggo.

John Priestly Ltd., 164 High St., Deritend, Birmingham. Manufacturers of and dealers in wireless and television apparatus, etc. Cap.: £1,000. Dir.: F. W. Watson.

R. G. Heaton and Son, Ltd., 108 Alexandra Rd., Moss Side, Manchester 16. Electrical contractors, etc. Cap.: £1,000. Permanent dirs.: S. W. Rothwell and F. Yeates.

Planos (Herts) Ltd., 25 Fore St., Hatfield. Manufacturers of and dealers in electrical copying duplicating, printing, typewriting and other machines, etc. Cap.: £100. Permanent dirs.: E. J. Hodge and Mrs. C. E. Secker.

Solenoids and Regulators Ltd. Manufacturers of and dealers in electrical switchgear and control gear, solenoids and mechanical apparatus used in connection therewith, etc. Cap.: £5,000. Dirs.: to be appointed by subs. Subs.: H. I. Yarwood, 251 Wake Green Rd., Moseley, Birmingham 13, and A. T. Yarwood, 40 Goodby Rd., Moseley.

St. Davids Assemblies Ltd., 1 New St., St. Davids, Pembs. Buyers, sellers, assemblers of and dealers in electrical switches, control switches and thermostats, etc. Cap.: £100. Dirs.: C. L. Faulkner and S. G. Read.

Companies Limited by Guarantee Without Share Capital

Electroencephalographic Society, The Outer Temple, 222-5 Strand, W.C.2. Word "Limited" omitted from title by licence of the B.o.T. Income and property of the Society shall be applied solely towards the promotion of its objects. Council: Dr. D. A. Pond, Hon. Sec.; Dr. W. Grey Walter, Hon. Foreign Sec.; Dr. W. A. Cobb, Hon. Treas.; Prof. L. Golla, President.

Engineers' Guild Ltd. To acquire assets and liabilities of existing unincorporated Association known as The Engineers' Guild, etc. Income and property of the Guild shall be applied solely towards the promotion of its objects. Council: H. Nimmo, Southern Electricity House, Maidenhead; W. S. Graff-Baker, Acton Works, Bollo Lane, W.3; T. M. Megaw, C. G. L. Morley and others.

MEETINGS TO NOTE

THURSDAY, APRIL 19

I.E.E. (S. Midland Students' Section).—"Design for a Radio Controlled Destroyer." I. A. McCord. G.E.C. Telephone Works, Copsewood, Coventry, 7 p.m.

I.E.E. (Irish Branch).—Annual meeting at 42 James's St., Dublin.

FRIDAY, APRIL 20

I.E.E. (N. Midland Centre).—Annual dinner and dance at Grand Hotel, Harrogate, 7.30 p.m.

I.E.S. (Birmingham Centre).—Discussion on "Street Lighting." E. Stroud and P. Crawford Sugg. Imperial Hotel, Temple St., 6 p.m.

MONDAY, APRIL 23

I.E.E. (London Students' Section). "Power Station Practice." Messrs. Silvester and Nash. Gt. Western Hotel, Reading, 7 p.m.

I.E.E. (London Radio Section).—Discussion on "The Trend of Design of Television Receivers." Savoy Pl., 5.30 p.m.

I.E.E. (London Students Section).—"Power Station Practice." J. E. G. Silvester and M. G. Nash. Gt. Western Hotel, Reading, 7 p.m.

TUESDAY, APRIL 24

INST. OF PRODUCTION ENGRS. (Luton Section). "Special Electric Control Gear Applications." R. K. Fleming. Igranic Electric Co., 7.15 p.m.

I.E.E. (S. Midland Students' Section).—"Induction Motor Brush Gear." G. Caplen. English Electric Assoc. Hall, Stafford, 7 p.m.

I.E.E. (N.E. Centre).—Faraday lecture on "Lamps and Lighting." L. J. Davies. City Hall, Newcastle, 7 p.m.

I.E.E. (N.W. Supply Group).—"Influence of Rectifier Harmonics in a Railway System on a Dielectric Stability of 33 kV Cables." S. B. Warder, E. Friedlander, and A. N. Arman. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.S. (Liverpool Centre).—"Scientific Relationship between Illumination and Photography." L. A. K. Carr. Service Centre, Whitechapel, 6 p.m.

WEDNESDAY, APRIL 25

I.E.E. (N. Midland Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean. 6.30 p.m.

I.E.S. (London).—Series of short talks on the history of lighting development. Lighting Service Bureau, Savoy Hill, 6 p.m.

I.E.E. (S. Midland Students Section).—"Induction Motor Brushgear." G. J. Caplan. English Elect. Assoc. Hall, Stafford.

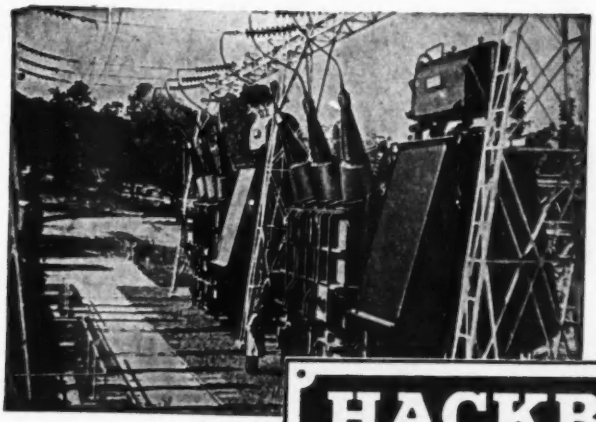
THURSDAY, APRIL 26

I.E.E. (London).—Kelvin lecture, "Modern Conceptions of Ultimate Structure of Matter." Sir John D. Cockcroft. Savoy Pl., 5.30 p.m.

I.E.S. (Nottingham Centre).—"Interior Decoration and its Influence on Illumination." S. A. Wood. Gas Showrooms, Parliament St., 5.30 p.m.

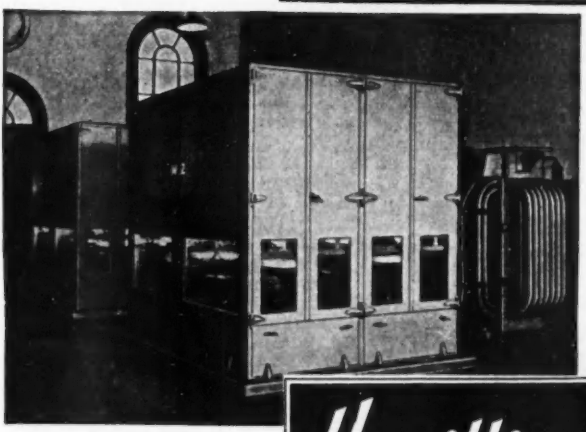
FRIDAY, APRIL 27

I.E.E. (Scottish Centre).—Faraday lecture on "Lamps and Lighting." L. J. Davies. Central Halls, Edinburgh, 7 p.m.



An installation of large Hackbridge transformers in Australia

HACKBRIDGE TRANSFORMERS



A 500 kW. Hewittic Rectifier installation supplying d.c. to motor-driven plant at a Gasworks

Hewittic Rectifiers

HACKBRIDGE Transformers and HEWITTIC Rectifiers have built up leading reputations in their respective fields of a.c. and d.c. electricity supply.

Modern developments in electricity distribution, industry, and electric traction, are making ever-increasing demands, both at home and overseas, for this world-famous equipment.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

"It's no trouble at all!"

Screwed & Socketed Gas Thread

Screwed & Socketed Conduit Thread

Light Gauge Tube

How often one hears that remark but how *true* it is when you are working with Metallic Conduit Tube and Fittings. For quality and consistent accuracy—

SPECIFY METALLIC

CONDUIT TUBE & FITTINGS

A TI COMPANY

THE METALLIC SEAMLESS TUBE Co. Ltd., Ludgate Hill, BIRMINGHAM 3. Tel. CEN 7167

Also at London, Newcastle-on-Tyne, Leeds, Swansea and Glasgow

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

PUBLIC NOTICES

SALE OF STOCK IN A UNITED KINGDOM COMPANY

THE Board of Trade announce that there is vested in the Custodian of Enemy Property a large block of ordinary stock in an important electrical engineering company in this country, which they are about to direct him to sell. The Board wish to sell in one block and will furnish, in confidence, to bona fide principals acting on their own behalf, particulars of the stock and a statement of the general conditions of sale.

Applications for information should be made not later than May 18, 1951, to the Controller-General, Administration of Enemy Property Department, (Treasury and Board of Trade), Branch 4, Lacon House, Theobalds Road, London W.C.1. (K 447)

TENDERS INVITED

CITY OF MANCHESTER

THE Education Committee invite tenders for:—
(a) Electrical installation to alterations, additions and reinstatement after war damage;
(b) Reinstatement after war damage of electric passenger lift;
at Lancasterian Special School, Didsbury, Manchester.

Specification and drawings may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s. each, which sum will be returned upon receipt of bona-fide tender. All cheques and postal orders are to be made payable to the order of "The Corporation of Manchester" and crossed.

Sealed tenders, enclosed in the official envelope, to be delivered to the Chairman of the Education Committee, Education Offices, Deansgate, Manchester 3, not later than 10 a.m. on Saturday, May 12, 1951.

The Corporation do not bind themselves to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
April, 1951. (K 469)

STANLEY RIVER WORKS BOARD

Queensland

ELECTRICAL EQUIPMENT FOR SLUICE GATES SOMERSET DAM

TENDERS closing at noon on July 2, 1951, at the office of the Co-ordinator General of Public Works, Brisbane, are invited for the manufacture, supply and delivery of Electric Motors, Motor Starters and Control Equipment for 13 Sluice Gate Winches for Somerset Dam.

The plans and specification are on view at the office of the Agent General for Queensland, 409-410, Strand, London W.C.2, and copies may be obtained from the Chief Engineer, Department of the Co-ordinator General of Public Works, Brisbane, Queensland, on payment of £1 per set.

The lowest or any tender will not necessarily be accepted.

Tenders should be endorsed "Tender—Sluice Gate Winch Motors."

L. H. PIKE,
Agent General for Queensland.
(K 491)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

THIRD ASSISTANT ENGINEER

Technical Department (Calculations and System Planning)

APPLICATIONS are invited for the above-mentioned appointment at Divisional Headquarters, Newcastle-upon-Tyne.

Candidates should have technical qualifications of at least Graduate I.E.E. standard, and experience connected with a large inter-connected power system. A University degree would be an advantage.

The engineer appointed will be required to carry out system-fault and load-flow calculations, and assist in planning and the preparation of reports. Experience in similar work is very desirable.

The salary will be in accordance with the National Joint Board Agreement, Grade 5, Schedule "C" (£579 to £753 per annum) and will commence at a point commensurate with qualifications and experience.

Superannuation will be in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne 1, to whom they should be returned to arrive not later than April 28, 1951. (K 407)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of an ASSISTANT to the Sub-Area Commercial Officer in the Eastern Sub-Area of the Board at Newport.

The successful applicant will be responsible to the Sub-Area Commercial Officer for all showroom and apparatus sales activities in the Sub-Area.

The salary for the position will be in accordance with Grade 6 (£630 to £705) of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than April 28, 1951.

D. G. DODDS,
Secretary.
(K 475)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT in the Commercial Department of District 347 (Cardiff) in the Central Sub-Area of the Board.

The successful applicant will be responsible to the District Commercial Manager for all domestic apparatus sales activities in the whole of the District.

The salary for the position will be in accordance with Grade 5 (£570 to £630) of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than April 28, 1951.

D. G. DODDS,
Secretary.
(K 476)

SUDAN GOVERNMENT

SUDAN RAILWAYS require TWO ELECTRICAL FOREMEN aged 25 to 35 years, for service in the Sudan, to undertake the duties of Electrical Foreman and any other duties of a like nature. The selected candidates will also be called upon to take part in the training of Sudanese staff without claim to extra remuneration.

Candidates should be experienced in maintenance of a.c. and d.c. distribution system, motors and equipment. Meter testing and power station (diesel) experience an advantage. Should have served full apprenticeship with recognised firm.

Appointment will be on short-term contract for five years, subject to satisfactory completion of probationary period, at a starting salary between £E.593 to £E.771 per annum. Salary on appointment is fixed according to age, experience and qualifications. Bonus of one month's pay for each year's service payable, subject to a maximum of six months' pay.

A cost-of-living allowance between £E.142 and £E.352 is at present payable according to number of dependents.

Outfit allowance of £E.40 is payable when contract is signed, provided appointment is at a salary not exceeding £E.1,012.

Further details are obtainable, on written application, from the Sudan Government Agency in London, Wellington House, Buckingham Gate, London S.W.1.

Please mark envelopes "Electrical Foreman 4/67."

(K 450)

HIS MAJESTY'S COLONIAL SERVICE

Gold Coast

TWO vacancies exist for BROADCASTING ENGINEERS in the Broadcasting Department, Gold Coast. Appointment is on three years' probation for pensionable employment in the salary scale £720 to £1,300, the point of entry being determined by war service and approved experience. In addition a temporary allowance of £114 to £150 is payable.

Free passages are granted to an officer, his wife and up to three children under the age of 8, once each way each tour. Furnished quarters, if available, are provided at a rent of £60 to £90 per year according to salary, and leave is granted at the rate of one week for each month of resident service after a tour of 18 to 24 months.

Candidates must be under the age of 40, be Graduates of the Institution of Electrical Engineers, and have at least two years' practical experience of wireless engineering work. They should write for further particulars and a form of application to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London S.W.1, giving brief details of age, qualifications and experience, and mentioning this paper and quoting No. 27326/44. (K 451)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of BOILER OPERATION ENGINEER, Portsmouth Generating Station.

Applicants should preferably be member of the Institute of Mechanical or Electrical Engineers, and must possess considerable operating experience of large modern high-pressure, stoker-fired boiler plant. The salary will be in accordance with Grade 7, Class "G" of the N.J.B. Schedule, at present £651 to £679 per annum.

The post is superannuable in accordance with the Authority's scheme, and a medical examination may be required.

Forms of application may be obtained from the Divisional Secretary. The latest date for the return of applications is May 4, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth.
April 14, 1951. (K 479)

MIDLANDS ELECTRICITY BOARD

Shropshire and Herefordshire Sub-Area

APPOINTMENT OF GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the above position in the Ludlow District of the Shropshire and Herefordshire Sub-Area.

Applicants must have had experience in all branches of distribution work, including erection, operation and maintenance of high and low-voltage cables, overhead and underground mains, sub-stations, etc. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and the provisional salary will be Class "D," Grade 10, £465 to £481 per annum.

Applications, stating age, present salary, full particulars of experience and present position, should be forwarded within 14 days to: Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury. (K 477)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of SENIOR ASSISTANT ENGINEER (Mains Construction and Maintenance) in the Central Sub-Area Headquarters, Cardiff.

Applicants should have considerable experience of construction and maintenance work on all classes of overhead lines up to 66 kV and underground cables up to 33 kV. They should be accustomed to carrying out large scale works both by direct labour and by contract, and must be capable organisers.

Preference will be given to candidates who have technical qualifications equivalent to the Associate Membership examination of the Institution of Electrical Engineers or who hold an Engineering Degree of a British University.

The salary for the position will be in accordance with Grade 4 Class "K" (£1,005 to £1,028 to £1,051) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than April 30, 1951.

D. G. DODDS,
Secretary.
(K 474)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of EFFICIENCY ENGINEER, Earley Generating Station.

Applicants should preferably be Corporate members of one of the senior engineering institutions, and must have had considerable experience in the operation of plant installed in large modern generating stations using pulverised fuel.

The salary, which is provisional and subject to negotiation, will be in accordance with Grade 7, Class "G," of the N.J.B. Schedule, at present £651 to £679 per annum.

The post is superannuable in accordance with the Authority's scheme, and a medical examination may be required.

Forms of application may be obtained from the Divisional Secretary. The latest date for the return of applications is May 4, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth.
April 14, 1951. (K 478)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

ASSISTANT ENGINEER (Operation and Maintenance)

Bracknell District of No. 1 (Southall) Sub-Area. Salary N.J.B., Class "E," Grade 7, Column 1 (£579 per annum) with N.J.B. conditions of service.

Duties will include the operation and maintenance of switchgear, transformers and cables up to and including 33 kV.

Applications, on forms obtainable from Sub-Area Secretary, 2/6 Windmill Lane, Southall, and returned to him not later than 10 days after the appearance of this notice

LADY DEMONSTRATOR

Greenford District of No. 1 (Southall) Sub-Area. Salary N.J.C., Grade 1 (£310 to £390 per annum, plus London Weighting); N.J.C. conditions of service.

Applicants should be qualified to advise generally on the utilisation of electrical appliances, to give cookery demonstrations in showrooms and in the homes of consumers and to assist in showroom duties. The possession of an E.A.W. Certificate or a Domestic Science Diploma would be an advantage.

Applications on forms obtainable from Sub-Area Secretary, 2/6 Windmill Lane, Southall, and returned to him not later than 10 days after the appearance of this notice.

LADY DEMONSTRATOR

Lyndhurst District of No. 4 (Bournemouth) Sub-Area. Salary N.J.C., Grade 1 (£310 to £390 per annum); N.J.C. conditions of service.

Applicants should be qualified to advise generally on the utilisation of electrical appliances, to give cookery demonstrations in showrooms and in the homes of consumers and to assist in showroom duties. The possession of an E.A.W. Certificate or a Domestic Science Diploma would be an advantage.

Applications on forms obtainable from Sub-Area Secretary, No. 1 Priory Road, Bournemouth, and returned to him not later than 10 days after the appearance of this notice.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.
(K 472)

BRITISH ELECTRICITY AUTHORITY

Chief Accountant's Department

APPLICATIONS are invited for a limited number of appointments in the Chief Accountant's Department at the Authority's Headquarters in London.

The vacancies exist within the following grades:

DEPUTY CHIEF ACCOUNTANT. Salary range £2,500-£3,000.

ASSISTANT CHIEF ACCOUNTANT. Salary range £1,500-£2,000.

ACCOUNTANT-IN-CHARGE. Salary range £1,100-£1,400.

All posts are superannuable.

Candidates should preferably be fully qualified accountants and members of a recognised accountancy body. They should also be experienced in electricity supply or some other public utility.

Applications, stating the grade for which they wish to be considered, age, present salary and appointment and giving full details of qualifications and experience, should be forwarded to D. Moffat, Esq., Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1, so as to be received not later than May 1, 1951.

Please quote reference AE/155. (K 440)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SHIFT CONTROL ENGINEER—LEICESTER GENERATING STATION

APPLICATIONS are invited for the position of Assistant Shift Control Engineer at Freeman's Meadow Generating Station, Leicester.

Candidates should have practical experience in the operation of modern generating station switchboards.

The salary will be in accordance with Class "H," Grade 14 of the National Joint Board Schedule (£435-£451 per annum).

The post will be superannuable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham and should be returned not later than May 7, 1951.

W. S. BURGE,
Divisional Controller.
(K 441)

CITY OF MANCHESTER

City Architect's Department

APPLICATIONS are invited for the appointment, on the permanent staff, of an:—

ELECTRICAL ENGINEERING ASSISTANT

Salary APT. III, £450 to £495 per annum. Candidates must be capable of preparing schemes for electric lighting and power installations in all types of municipal buildings and should have passed the intermediate examination or its equivalent.

The salary and conditions of service will be in accordance with the National Joint Council's Scheme of Service Conditions.

Forms of application may be obtained from and should be returned, together with not more than three recent testimonials, to Leonard C. Howitt, B.Arch., F.R.I.B.A., City Architect, Town Hall, Manchester 2, by April 30, 1951, endorsed: "Electrical Engineering Assistant."

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester 2.
April, 1951. (K 421)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT MAINTENANCE ENGINEER (ELECTRICAL)

APPLICATIONS are invited for the position of Assistant Maintenance Engineer (Electrical) at Longford Generating Station, Coventry.

Salary and conditions of service will be in accordance with the N.J.B. Schedule, Grade 6, Class "G," and the post will be superannuable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applicants should have received a thorough technical and practical training with experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment.

Preference will be given to candidates who are associated members of a recognised institution or possess similar qualifications.

Applications should be submitted on the official form which can be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than May 14, 1951.

W. S. BURGE,
Divisional Controller.

63/2/3/171 (K 482)

BOROUGH OF WILLESDEN

APPOINTMENT OF ELECTRICAL ENGINEERING ASSISTANT

THE Council invite applications for the appointment of an Electrical Engineering Assistant on the permanent staff of the Borough Engineer and Surveyor's Department.

The salary attaching to the post will be Administrative, Professional and Technical Grades III/IV of the National Whitley Council Scale for the London area, namely £450 per annum, rising by £15 per annum to £525 per annum, plus London Weighting according to age.

Candidates for the appointment must possess one or more of the following qualifications, namely the Higher National Certificate in Electrical Engineering, the Joint Section A Examination of the Institution of Civil Engineers and the Institution of Electrical Engineers and in addition have some training and practical experience on general installation and maintenance of electrical engineering work.

The appointment, which will be terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, giving age, experience, etc., accompanied by copies of not more than three testimonials, should be addressed to the undersigned, endorsed "Electrical Engineering Assistant" not later than 10 a.m. on Friday, May 11.

It will be necessary for the successful candidate to provide his own housing accommodation as the Council is not in a position to assist.

Canvassing, directly or indirectly, will be deemed a disqualification.

R. S. FORSTER,
Town Clerk.

Town Hall,
Dyne Road, Kilburn, N.W.6.
April 12, 1951. (K 493)

ELECTRICITY SUPPLY BOARD (IRELAND)

APPOINTMENT OF ASSISTANT CHEMIST

APPLICATIONS are invited from suitably qualified persons for a position as Assistant Chemist in the Board's organisation.

As a minimum qualification, applicants must hold a degree in chemistry or its equivalent, and must be capable of carrying out, under supervision, the normal work associated with the laboratory in a power station.

The salary scale attaching to the position is £440 per annum, rising by annual increments of £20 to a maximum of £650 per annum. In addition, a cost-of-living bonus is at present paid. The commencing salary will depend on the qualifications and experience of the successful applicant.

The appointment will be subject to passing medical examination and to a satisfactory probationary period of 12 months. The successful applicant will be required to join the Board's Superannuation Scheme, subject to acceptance by the Committee.

Applications, indicating age, qualifications, particulars of training, and experience, and accompanied by relevant testimonials, should reach the undersigned not later than Wednesday, April 25, 1951.

(Holders of a University degree should indicate whether qualified with honours, or not, and the subjects taken in their final examination, as physics is regarded as essential.)

PATRICK J. DEMPSEY,
Secretary.

Electricity Supply Board,
27 Lower Fitzwilliam Street,
Dublin. (K 422)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for positions as SHIFT CHARGE ENGINEERS at the Westwood Generating Station, Wigan.

The salaries for these positions, which are superannuable, will be in accordance with Grade 7, Class "G" of the National Joint Board Agreement, i.e. £651 to £679 per annum.

Candidates should preferably be in possession of technical qualifications, and previous experience in a generating station is essential.

Applications, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than April 29, 1951. (K 449)

BRITISH ELECTRICITY AUTHORITY

South Western Division

POWER STATION SUPERINTENDENT—EXETER POWER STATION

ATTENTION is drawn to the salary quoted in respect of the above advertisement published in last week's copy of this journal.

The salary for the appointment should have read £883-£917 per annum and not £883-£967 per annum.

R. C. BARRETT,
Divisional Secretary.

April 11, 1951. (K 442)

NORTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 1 Sub-Area

JUNIOR ENGINEER (Testing Assistant)

Applicants should have had experience of testing work associated with meters, instruments or protective equipment, and should be in possession of at least the Ordinary National Certificate and preferably the Higher National Certificate. Experience in manufacturers' works will be considered an additional recommendation.

The salary will be in accordance with the National Joint Board Revised Schedule, within the range of Class M, Grades 21-17, i.e. £375-£481 per annum.

JUNIOR ENGINEERS, Operation Section, Mains Engineer's Department.

Applicants will be required to assist with the carrying out of switching duties on a large E.H.V. and L.V. transmission and distribution system, including supervisory control.

Opportunities will be provided as circumstances permit for experience to be gained in other sections of the Mains Engineer's Department.

A basic works training of not less than two years, and the possession of either a Higher National Certificate in Electrical Engineering or an equivalent qualification, will be considered an advantage.

The duties will be on a shift basis, and the salary will be in accordance with the National Joint Board Revised Agreement, Class M.21 to M.17, i.e. £375-£481 per annum.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by the Sub-Area Secretary, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, not later than Saturday, April 28, 1951.

No. 2 Sub-Area

SECOND ASSISTANT ENGINEER (System Planning and Development).

Applications are invited for the above appointment in the System Planning and Development Section of the Technical Engineer's Department, No. 2 Sub-Area Headquarters, National Buildings, St. Mary's Parsonage, Manchester 3.

The salary for the post will be in accordance with the Revised National Joint Board Agreement, Class L, Grade 7, i.e. £841/861/881 per annum.

Candidates must have had a sound training in Electrical Engineering to Degree or Higher National Certificate standard and responsible experience in several of the following branches:—

(1) Planning and construction of 33 kV and lower voltage systems;
(2) Maintenance and operation of 33 kV and lower voltage systems;
(3) Sub-station design and construction;
(4) Calculation of fault levels, etc.;
(5) Application of Protective Gear;
(6) Planning and Installation of Telecommunication, Supervisory and Ripple Control Equipment;
(7) Estimating and Specification of Distribution Plant.

Applications, stating age, training and experience, qualifications, present post and salary, should be received by E. G. Wardle, A.M.I.E.E., Sub-Area Manager, No. 2 Sub-Area, National Buildings, St. Mary's Parsonage, Manchester 3, not later than Saturday, April 28, 1951.

No. 3 Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER

Applications are invited for the above appointment in the Stalybridge District of the No. 3 Sub-Area.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class F, Grade 7, i.e. £625/634/643 per annum. The post is superannuable.

The engineer appointed will be required to undertake standby duties and to assist generally the District Engineer with his duties relating to the operation and maintenance of high and low voltage networks (underground and overhead) and sub-stations; the supervision of such constructional work as may be necessary; the keeping of technical records; the general maintenance of supply and for such other matters as may be necessary.

Preference will be given to applicants who are Graduates of the Institution of Electrical Engineers or who hold exempting qualifications.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday April 28, 1951.

No. 5 Sub-Area

SECOND ASSISTANT ENGINEER (Operation and Maintenance)

Applications are invited for the above appointment in the Sub-Area Mains Engineer's Department at the No. 5 Sub-Area Headquarters, Jubilee Street, Blackburn.

Applicants should have had a wide experience in the operation and maintenance of high voltage and low

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voltage networks, including both overhead lines and underground cables of voltages up to and including 33 kV, also high voltage testing and fault localisation.

Corporate membership of the Institution of Electrical Engineers will be an advantage.

The salary for the post will be in accordance with the National Joint Board Schedule, Class J, Grade 7, i.e. £736/753/770 per annum.

DEMONSTRATOR—Burnley District

Candidates must have had a good education with training in Domestic Science. Preference will be given to applicants who hold the E.A.W. Diploma. If the Diploma is not already held, the successful candidate will be expected to take suitable courses to obtain it. The person appointed will be required to give lectures and demonstrations on all types of domestic appliances and advise consumers in the choice of equipment.

The salary will be in accordance with Grade 1 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Grades i.e. £310 per annum, rising by annual increments of £20 to a maximum of £390 per annum.

Applications for the above appointments, stating age, qualifications, experience, present post and salary, should be received by R. H. Harral, M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, April 28, 1951.

No. 6 Sub-Area

GENERAL ASSISTANT ENGINEER (Power Sales) Sub-Area Headquarters

Applicants should have knowledge of and preferably experience in:—

(a) The utilisation of electricity in industry with particular reference to large industrial users, quarries and mines. A knowledge of the economics of power production, plant and public supply, together with experience in the negotiations of electricity supply agreements, and changeover from D.C. to A.C., is desirable.
(b) Application of all types of lighting to industrial premises and installation of street lighting and preparation of specifications.

Technical training to Higher National Certificate Standard will be an advantage.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class H, Grade 13, i.e. £458/467/476 per annum.

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEERS, Whitehaven and Carlisle Districts

Applications are invited for the above appointments in the Whitehaven and Carlisle Districts of the No. 6 (Lakeland) Sub-Area.

The successful applicants will be required to assist generally with the following duties:—

(a) Domestic and Commercial Development Sales including Hire and Hire Purchase transactions;
(b) Supervision of Service Centres;
(c) Publicity and Display;
(d) Organisation of Exhibitions, Lectures, Demonstrations and Film Shows;
(e) Advice on Agriculture and Horticulture supplies.

Technical training to National Certificate Standard will be an advantage.

The salaries for the posts will be in accordance with the National Joint Board Revised Schedule as follows:—

Whitehaven District—Class D, Grade 11, i.e. £436/444/452 per annum.
Carlisle District—Class E, Grade 11, i.e. £459/467/475 per annum.

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEERS, Whitehaven, Penrith and Carlisle Districts

Applications are invited for the above appointments in the Whitehaven, Penrith and Carlisle Districts of the No. 6 (Lakeland) Sub-Area.

Applicants must have a detailed knowledge and wide experience of the utilisation of electricity for Domestic, Commercial and Agricultural purposes including the following:—

(a) Domestic and Commercial Development Sales including Hire and Hire Purchase transactions;
(b) Supervision of Service Centres;
(c) Publicity and Display;
(d) Organisation of Exhibitions, Lectures, Demonstrations and Film Shows;
(e) The application of electricity to agriculture and horticulture.

Technical training to Higher National Certificate Standard will be an advantage.

The salaries for the posts will be in accordance with the National Joint Board Revised Schedule as follows:—

Carlisle District—Class E, Grade 7, i.e. £579/594/609 per annum.
Whitehaven and Penrith Districts—Class D, Grade 7, i.e. £563/568/573 per annum.

DEMONSTRATORS, Whitehaven and Carlisle Districts

Applications are invited for the above appointments in the Whitehaven and Carlisle Districts of the No. 6 (Lakeland) Sub-Area.

Applicants should be experienced in public demonstra-

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tions of electric cookers and other electrical appliances and hold a recognised certificate in Domestic Science.

Should the successful candidate not already hold the E.A.W. Certificate, she will be expected to take suitable courses to obtain the Certificate, and eventually the Diploma.

The salaries for the posts will be in accordance with Grade 1 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Grades, i.e. £310/£20/£390 per annum. (Progress beyond £350 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade).

Applications for the above appointments, stating age, education, qualifications, experience, present position and salary, should be received by the Sub-Area Manager, No. 6 (Lakeland) Sub-Area, The North Western Electricity Board, Castle Green, Kendal, not later than Saturday, April 28, 1951. (K 461)

SOUTH EASTERN ELECTRICITY BOARD

DEMONSTRATOR—Eastbourne District.

Salary of £310 by £20 to £390 per annum under N.J.C. Agreement, Grade 1. Superannuation will be arranged. Applicants must be experienced in demonstrating to consumers in their own homes all types of domestic electrical appliances and be able to organise and conduct public lectures. Appropriate Domestic Science or Housecraft qualifications an advantage.

Applications on forms obtainable from J. E. Winborne, Eastbourne Manager, South Eastern Electricity Board, Electric House, Grove Road, Eastbourne, must be returned by April 30, 1951.

SENIOR SHOWROOM ASSISTANT—Kingston Showroom.

Salary of £390 by £20 to £450 p.a, plus London Weighting under N.J.C. Agreement, Grade 2. Superannuation will be arranged. The person appointed will be responsible to the District Commercial Engineer for the Kingston Showroom. Applicants should have had experience in an electricity showroom and be capable of advising consumers on electrical appliances and fittings.

Application forms obtainable from D. C. Thomson, B.Sc., M.I.E.E., Kingston and District Manager, South Eastern Electricity Board, 22, Claremont Road, Surbiton, Surrey, to be returned by April 30, 1951.

METER REPAIRER (MECHANICIAN)—Dorking District.

Wages 3s. 0½d. per hour for 44-hour 5-day week under the N.J.I.C. Agreement for manual workers in the Electricity Supply Industry. Duties include reading and inspection of meters and carrying out minor repairs and adjustments to prepayment meters and time switches.

Applications, stating age and experience, and giving two referees, must reach S. Gill, A.I.E.E., Dorking Manager, South Eastern Electricity Board, 56, South Street, Dorking, by April 30, 1951.

DISTRICT COMMERCIAL ASSISTANT—Woking District.

Salary of £390 by £20 to £450 p.a. under the N.J.C. Agreement, Grade 2. Superannuation will be arranged. Applicants should have had experience in domestic and industrial consumers' service, the installation and use of electrical appliances, preparation of wiring estimates and supervision of all types of wiring work, also a knowledge of tariffs and their application.

Applications, on forms obtainable from F. Woods, M.B.E., M.I.E.E., Woking Manager, South Eastern Electricity Board, Chobham Road, Woking, Surrey, must be returned by April 30.

ASSISTANT ENGINEER—Folkestone District.

Salary of £524 to £542 p.a. under N.J.B. Schedule, Class "D," Grade 8. Superannuation will be arranged. Applicants must have experience of distribution work, including the construction, maintenance and operation of h.v. and l.v. cables, a.c. and d.c. switchgear, transformers, overhead lines, sub-stations, protective gear, etc., and must possess Higher National Certificate or equivalent qualification. Duties involve standby.

Applications, giving two referees, must reach P. V. Gurr, J.P., Folkestone Manager, South Eastern Electricity Board, York House, Cheriton Gardens, Folkestone, by April 30, 1951.

A. L. BURNELL,
Secretary.

April, 1951. (K 473)

SOUTH EASTERN REGIONAL HOSPITAL BOARD, SCOTLAND

APPLICATIONS are invited for the post of ENGINEERING ASSISTANT (Electrical).

Applicants should be capable design draughtsmen with wide experience of illumination and power installation design and practice. Preference will be given to applicants with appropriate engineering qualifications.

Salary scale will be in accordance with A.P.T. Grades 6 and 7 (£595 to £710) and the appointment will be subject to the National Health Service (Scotland) (Superannuation) Regulations.

Applications, giving full particulars of training and experience, together with the names and addresses of three referees, should be sent to the Secretary, South-Eastern Regional Hospital Board, 11 Drumsheugh Gardens, Edinburgh 3, not later than May 10, 1951. (K 448)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following positions:

No. 415. JUNIOR ENGINEERS, Agecroft H.P. Generating Station, Pendlebury, Lancs.

The salaries for these positions will be within the range £375-£428 per annum, in accordance with Grades 16/14, Class "C."

No. 416. STATION SHIFT CONTROL ENGINEER, Burnley Generating Station, Grimshaw Street, Burnley.

The salary range for this position will be £438-£456 per annum, in accordance with Grade 10, Class "C."

Candidates for these positions should preferably possess technical qualifications, and previous experience in a generating station is desirable.

The posts will be superannuable, and the salaries will be in accordance with the National Joint Board Agreement.

Applications, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than April 28, 1951. (K 439)

BRITISH ELECTRICITY AUTHORITY

INSTRUMENT ENGINEER

Kingston 'B' Power Station

EXPERIENCE in maintenance, testing and calibration of all types of Power Station electrical and mechanical instruments essential. Higher National Certificate preferable. N.J.B. conditions and salary Class G, Grade 10, £565 19s. p.a. subject to confirmation by N.J.B. and including London Allowance.

Applications on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-upon-Thames, to be returned by April 28, 1951. (K 462)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL ENGINEER (Meters and Protection), required by the Central Electricity Board, Federation of Malaya, for 3 years with prospect of permanency. Salary (including expatriation pay) payable in local currency, equivalent at the present Government rate of exchange to £742 a year, rising to £1,652 a year. Commencing salary according to age and experience. Cost of living allowance equivalent to between £252 and £630 a year according to salary and dependants. Free passages. Liberal leave on full salary. Candidates between 24 and 35 years of age must have had a good general education and be Corporate Members or Graduates of the Institution of Electrical Engineers or possess equivalent qualifications and have had sound practical experience in connection with the testing of meters, protective equipment, high and low voltage switchgear instruments and general testing work on a high voltage network, and be capable of planning and taking charge of a testing laboratory for an area roughly equivalent to a B.E.A. Sub-Area. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M.25727.B, on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 492)

A LEADING manufacturer of electric cookers requires a TECHNICAL REPRESENTATIVE for the Midlands, centred on Birmingham. Must be experienced. Good salary and expenses.—Please send full particulars to Box No. 5059, Electrical Times. (K 434)

APPLICATIONS are invited by the English Electric Co., Ltd., for vacancies for ENGINEERS to deal with all orders taken by the Company for Steel Works Installations and other Metal Industries projects. These comprehensive orders cover the whole field of electrical equipment, supply switchgear, rectifiers, rotating machinery, control gear and electronic apparatus. Applicants should be young men who have served a recognised relevant apprenticeship, and who have at least Higher National Certificate. The positions are permanent and progressive, and afford excellent opportunities.—Please write, giving full details and quoting Ref. 489, to Central Personnel Services, English Electric Co., Ltd., 24/30 Gillingham Street, London, S.W.1. (K 460)

ARMATURE WINDERS required for d.c. and a.c. work. London district; five-day week. Applicants should give full details of experience.—Box No. 5051, Electrical Times. (K 415)

ARMATURE WINDER required in repair and rewind department. Excellent prospects and rates.—Max Arc and Electrics, Ltd., 190 Thornton Road, Croydon. (K 494)

DESIGN AND DEVELOPMENT ENGINEER is required by a leading firm of Desk and Ceiling Fan Manufacturers. Electrical knowledge an advantage, but primary qualification is mechanical design including experience in oscillating mechanisms. Please state full details of previous experience and salary level desired. Birmingham area.—Box No. 5056, Electrical Times. (K 434)

ELECTRICAL ENGINEER DRAUGHTSMAN required with experience in the design and installation of power and lighting schemes, distribution and control diagrams, etc. Excellent prospects for suitable men offered by Teeside firm.—Apply, giving full particulars, quoting reference, to Box No. 5025, Electrical Times. (K 345)

ELECTRICAL ENGINEER, preferably qualified, and/or with commercial experience, required for responsible position in Pakistan. Minimum salary adequate for local conditions including social expenses and will be in accordance with qualifications and experience. Single man aged 25-35 preferred. Applicants must have sound knowledge theory and practice of power transmission and distribution. Selected applicant will receive training in factory before going abroad. Knowledge of line communication system an advantage. The post offers good prospects with an old established company.—Apply Box No. 5037, Electrical Times. (K 369)

ELECTRICAL ENGINEER required for Middle East duty by large Oil Company. Honours degree and/or A.M.I.E.E. with experience in H.T. and L.T. Overhead and Underground Transmission and Distribution Systems; installation and operation of medium-sized Diesel Power stations; industrial and domestic installations for power and lighting and operation of an electrical workshop. Age limits 30 to 40. Substantial salary and allowances; free furnished quarters (messing or allowances in lieu); paid Home Leave at two-yearly intervals; initial period of separation from family.—Write, giving full details of experience and quoting No. 75, to Box 4102, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (K 459)

ELECTRICAL SUPERVISOR required to take charge of maintenance and general duties on production plant, together with supervision of shift electricians. Salary £550 p.a. Must be experienced in operation and maintenance of industrial installations including the following units: 6.6 kV switchgear and motors, rectifiers, storage, battery and charging plant, together with MV installation totalling 3,000 kVA.—Full particulars, including qualifications and age, to be forwarded to Works Manager, Philblack Ltd., Avonmouth Docks Estate, Avonmouth. (K 489)

ELECTRICAL TESTER required for motor repair and rewind section. Very good prospects and payment according to experience.—Max Arc and Electrics Ltd., 190 Thornton Road, Croydon. (K 429)

ELECTRICIAN for heavy power installations required for large contract (3 to 5 years) in Buenos Aires. Must have experience in erecting and commissioning of 6.6 kV switchgear, l.t. controlgear, etc., and in laying and jointing of 6.6 kV 3-core Pilcswa cables, and multicore control cables.—Apply to the Harland Engineering Co., Ltd., Alloa, Scotland, giving details of experience and jobs held. Man selected will be required to sail on August 1, 1951. (K 445)

ELECTRONIC ENGINEERS required by Government Department for unestablished post. Experience of development work including circuit design in telecommunications and of pulse techniques an advantage. Higher National Certificate or equivalent essential. Pay: £325 at 21 with increments of £25 to £425 at 25. Applicants over the age of 25 start at the 25 age point. Satisfactory performance of duties leads, after age 25 and at least a year's service to a grade with salary £425-£600. London rates are quoted; provincial rates are rather less. Further prospects of advancement on merit to a grade with maximum of £700. Apply for application form to M.L.N.S. Technical and Scientific Register, (K) York House, Kingsway, W.C.2, quoting D85/51-A. Closing date June 14, 1951. (K 457)

ESTABLISHED British company requires SENIOR ELECTRICAL DRAUGHTSMEN, due to further expansion. Experience of power distribution and lighting installations as required for the Oil Refinery and Chemical industry preferable. Qualifications to H.N.C. standard. Substantial salaries paid.—Write, stating age, qualifications and experience, to Box 4106, c/o Charles Baker and Sons Ltd., 31 Budge Row, London E.C.4. (K 458)

ESTIMATOR required for steel, wood and concrete transmission lines. All voltages. Candidates with experience in structural steelwork will be considered. Experience in foreign contracts an advantage.—Apply, giving details of experience and education, to Enfield Cables Ltd., 81 Mitchell Street, Glasgow C.1. (K 428)

EXPERIENCED ENGINEERS accustomed to the erection of lattice tower, concrete and wood pole overhead transmission lines and willing to serve either at home or overseas, age 25-45. Good prospects and pension. —Apply in writing, giving full details to Staff Officer, British Insulated Callender's Construction Company, Limited, 21 Bloomsbury Street, London W.C.1. (K 444)

EXPERIENCED LINESMEN required for power-line construction work in all parts of the British Isles at London rates.—Please apply in writing to Contract Department, Henley's Telegraph Works, 58-62 High Holborn, London W.C.1, giving age and details of recent experience. (K 432)

LADY DEMONSTRATOR required by leading manufacturers of electric cookers to undertake duty in the Midlands. Must be experienced and qualified. Good salary.—Particulars to Box No. 5035, Electrical Times. (K 353)

LONDON Manufacturer requires AGENTS for Midlands and Newcastle areas. Must be experienced in the knowledge of electric motors and applications.—Apply Box 5193H, A.K. Advtg., 212a Shaftesbury Avenue, London W.C.2. (K 464)

OVERHEAD LINE CONSTRUCTION. Scottish organisation require Technical Engineers and Assistants, Site Engineers and Assistants, Surveyors, Foreman Linesmen and Linesmen. Good prospects. Good salaries and wages. Superannuation scheme.—Apply in confidence to Box No. 5063, Electrical Times, giving full particulars and salary required. (K 436)

POWER PLANT CHARGE ENGINEER required by major oil company for employment in the Middle East to operate a combined gas and steam turbine station where he will take charge of a shift. Applicants who should be under 30 years of age, must possess a Higher National Certificate in electrical engineering and have served an apprenticeship in the generation division of a power supply organisation undertaking power station control room operation, followed by experience as a boiler house or turbine room charge engineer. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangements, pension scheme.—Write, stating personal particulars and details of qualifications and experience, quoting Dept. F.13.F, to Box 3336 at 191 Gresham House, E.C.2 (H 416)

PRODUCTION CONTROLLER required. Electric switchgear manufacturers. Applicants require first-class experience and ability to take full responsibility of a heavy and complicated programme.—Full particulars and details of salary to Box No. 5043, Electrical Times. (K 390)

REQUIRED, ELECTRONICS/ELECTRICAL DESIGNER take charge design and dev. wide range covering, electronic welding and process controls, small spot welders, rectifier units up to 50 kW. Valve and relay circuitry experience essential. Should have degree or equiv. with practical outlook. State age, experience and salary required.—Hirst Electronic Development, Ltd., Dermody Road, London S.E.13. (K 331)

REQUIRED SENIOR AND JUNIOR TRANSFORMER SALES ENGINEERS with experience in sales and contract working.—Please apply, giving full details of experience and salary required to Hackbridge and Hewittic Electric Co. Ltd., Hersham, Walton-on-Thames. (K 454)

SCOTTISH Electrical Contractors, carrying out all types of electrical installation, are augmenting their staff and having vacancies for all types of experienced men, are prepared to accept applications from Assistant Showroom Managers, Outside Sales Representatives, Estimators, Supervisors, Charge Hands, Cable Jointers, Electricians, Wiremen, Refrigeration Mechanics, etc. Good salaries and wages, good prospects. Superannuation scheme.—Apply in confidence to Box No. 5061, Electrical Times, giving full particulars and salary required. (K 435)

SENIOR CONTROL GEAR ENGINEER required for development design of automatic and non-automatic a.c. and d.c. control gear, oil switches, and allied gear. Location South Midlands. Please give full particulars of technical training, previous experience and salary required.—Box No. 5057, Electrical Times. (K 425)

SENIOR ELECTRICAL ENGINEER, age about 40, required by British managed group of Power Stations in India. Should be M.I.E.E. or equivalent, and be fully experienced all branches power generation and distribution, and some knowledge of administration and control of labour. Initial agreement four years at commencing salary equivalent to £2,000 p.a. rising to £2,190 for fourth year. Excellent opportunity promotion in two or three years. Free quarters, medical attention, passages and car provided. Under non-contributory pension scheme approximately £360 p.a. payable at age 55.—Application in writing, giving full details of qualifications and experience to Box 4111, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (K 463)

TEST ROOM ASSISTANTS required by electrical measuring instrument manufacturers in West London Area.—Reply Box No. 5069, Electrical Times. (K 453)

TEST-ROOM require experienced man with some technical training for rotating electrical machines up to 6 kW. Large variety of designs. South-East London.—Box No. 5075, Electrical Times. (K 468)

THREE ESTIMATING ENGINEERS urgently required in Sheffield. Must have held similar position with an electrical contractor and be fully experienced in dealing with large industrial electrical installations.—Applications in writing, giving full details and salary required, to Chief Engineer, F. H. Wheeler (Sheffield) Ltd., Electrical Engineers and Contractors, Wharncliffe House, Bank Street, Sheffield 1. All applications will be treated with strict confidence. (K 423)

WANTED, ELECTRICAL ENGINEER to take charge of dyeworks electrical plant. Applicant residing locally an advantage.—Apply by letter, stating age, qualifications, and salary required, to Percy Andrew and Son, Ltd., Leen Valley Dyeworks, Bulwell, Nottingham. (K 420)

WANTED, ELECTRICAL ENGINEERS for employment in Malaya. Salary dependent on experience and qualifications.—Apply, giving detailed particulars of experience. State age and whether married or single.—Write Box E.T. 803 at 191 Gresham House, E.C.2. (K 443

APPOINTMENTS WANTED

OVERSEAS, BUSINESS AND RESEARCH EXPERIENCE

A QUALIFIED ELECTRICAL AND ELECTRONICS ENGINEER experienced in Research, Development and Business Overseas, is now available to take a position offering attractive salary and opportunity for advancement.

He has an excellent record of service with several major companies and will be interested to discuss various ways of fitting into your organisation.

Would you please write to **Box No. 5011,** Electrical Times, for more information. (K 304p)

AN established connection with the B.E.A.'s wholesale and retail available manufacturer domestic commodities. Southern Counties. Expenses and commission basis.—Box No. 5021, Electrical Times. (K 343)

ELECTRICIAN (31), fully conversant contracting and maintenance; good references; married accommodation required.—Box No. 5045, Electrical Times. (K 391)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co. Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street Hove (Tel.: 32996), electrical engineers and winding specialists. Distance no object. (F 739)

CAPACITY available for light assembly of electrical/mechanical equipment complete from drawings or prototype model, including tooling moulds, machining and test if required.—Box No. 5077, Electrical Times. (K 485)

CASTINGS, Fisher Foundries Ltd., Greet, Birmingham have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

OLD-ESTABLISHED manufacturers have capacity for special equipment, machining, winding, light assembly, finishing sheet metal work, etc.—Majestic Electric Co. (1937), Ltd., 15 Queensway, Enfield, Middlesex. (K 166)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

ELECTRICAL STEEL OFF-CUTS OR COREPLATES required. Small and large quantities taken, approx. 0·024-in. gauge, minimum width 3 in.—Box No. 4077, Electrical Times. (K 219)

P.V.C. TWIN-TWISTED OR FLAT 14/0076 or 7/0076 required, large or small amounts.—L. C. Northall, 16 Holly Road, Quinton, Birmingham 32. Woo 3166. (K 417)

REQUIRED, "Admiralty" pattern 220 V d.c. 180/220 V 1-phase 1,000 cycles ROTARY CONVERTERS.—Oldfield Engineering Co. Ltd., 96 East Ordsall Lane, Salford 5. (K 488)

STEEL, ALUMINIUM, BRASS, Sheets, Strip, Bars, Off-cuts. Any quantity—immediate payment.—Grades Sheared Metal Co. Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (K 387)

SURPLUS stocks of rectangular section COPPER WINDING WIRES, Bare, cotton, and paper covered. —Offers to Oldfield Engineering Co. Ltd., 96 East Ordsall Lane, Salford 5. (K 396)

URGENTLY REQUIRED, large quantity of each of the following items:—¾ in., 1 in. and 1¼ in. conduit tubing.—Details of quantity, condition and price to: C. W. Shale and Co., Windsor Street, Birmingham 7. (K 487)

WANTED, Surplus stocks of Hand, Precision and Cutting Tools, Twist Drills, Taps and Dies, Files, Reamers, Cutters, etc.—Send details to B. Draper and Son, 1 Grange Road, Kingston-on-Thames. We pay cash upon delivery. (K 76)

WANTED, SCRAP ELECTRIC MOTORS, DYNAMOS AND CABLE. Top prices paid.—H. Reed, 36 Bridge Street, Leatherhead, Surrey. (K 11)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED, Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (A 13)

9 KVA 230 V 1-phase 50 cycles Diesel engine driven ALTERNATOR. Must be absolutely in sound electrical and mechanical condition and guaranteed.—Box No. 5073, Electrical Times. (K 467)

FOR SALE

CABLES & WIRE

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (G 381)

46 S.W.G. Enamelled and Single Art Silk Covered H.C. Copper WIRE. Delivery stock. Also similar insulations of various dimensions.—Saxonia. Greenwich 1672. (K 465)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

ENGINEERING PLANT & MATERIALS

ALUMINIUM TUBING: Surplus to requirements, 2 ft. o.d. 16 s/gg. 99·25 per cent. pure. Approx. 3,000 lb Hard temper, 3/6 per lb; carriage extra.—Robinson (Plastics) Ltd., Milton Street, Hollinwood, near Oldham. FAI 1653. (K 367)

REAVELL AIR COMPRESSOR, F.A.D. 44 c.f. complete with 12-h.p. motor, switch and receiver for 80 lb. pressure; can be seen running; price £150.—Wingard (M.A.) Ltd., Kingsham Road, Chichester. Tel.: Chichester 3236/7. (K 366)

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VALES PLANT REGISTER, LTD.

(Established over 25 years)

offer for sale:

NEW 1,110 kW DIESEL GENERATOR SETS, direct coupled to 1,600 h.p. 16-cylinder diesel engines. With switch gear. Available for early delivery.

Further details :

14 LOWER GROSVENOR PLACE, S.W.1.

Telephone No.: VICtoria 7531, 3501, 8080 (11 lines) (K 455p)

PETROL ELECTRIC GENERATING PLANTS (3), J.A.P. No. 5 single-cylinder engine. Direct coupled to alternator. Automatic voltage control. Output: 110 V, 50 cycles, 1·5 kVA.—Offers to J. L. Strickland, 7 St. Mary's Grove, S.W.13. (K 430)

TANGYE GENERATOR for sale, 220 V, d.c., 130 amp, with control panel. Driven by 34 b.h.p. single-cylinder horizontal diesel engine. Inspect at works in W. England. —F. J. Edwards, Ltd., 359 Euston Road, London N.W.1. (K 426)

METERS

A.C./D.C. QUARTERLY AND SLOT-METERS. Guaranteed, sent on approval if desired.—Brent Electrical Co., 6 Holmdale Gardens, London N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly, single and 3-phase, 3- and 4-wire, 2½ to 100 amps. Pre-payment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I., billiards switches, rent collectors. Prices from 5s. carriage paid. Guaranteed for ever. Immediate delivery. Illustrated catalogue from: The Electric Meter Co., Castor Road, Brixham. (K 394)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co. Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

UNCLASSIFIED

ELECTRICALLY EQUIPPED ATTRACTIVE HOUSE, with large garden. Good position, to let N.W. London. No Agents.—Box No. 5079, Electrical Times. (K 490)

80 NORMALISING tanks circular, 16 in. dia., by 21 in., 230 V, thermostat 0/120 deg. Far.—James H. Williams, 37 Charles Street, Cardiff. Tel. Cardiff 752. (K 484)

LIGHTING EQUIPMENT

FOR Sale, 4 Cases each containing 10,000 SILVER CAP TORCH BULBS, "Flying Horse" brand, 2.5 V, 3 amp. Collection London.—Box No. 5067, Electrical Times. (K 438)

PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

WE have a quantity of 1,500-watt, 230 V G.E.S. gas-filled lamps for sale. All brand new. —Offers to Messrs. A. H. Leach and Co. Ltd., Photo Works, Brighouse, Yorkshire. (K 456)

80 DISPERSIVE reflectors 16 in. dia. by 10½ in. high. Complete with X.E.S. lampholders. In excellent condition.—The Silent Channel Co. Ltd., Huntingdon (Tel. 292). (K 483)

THERMAL FLASHERS

All Types

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ELECTRICAL ACCESSORIES

42 THAMES ST., HAMPTON, MIDDX

Obtainable from all Leading Wholesalers

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(K 222)

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ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.

STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC

Any voltage, new, short delivery, all types of revolving electrical power.

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London N.W.9
Telephone: COLindale 4621/2. (D 17p)

A.A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel.: 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

D.C. MOTORS.

400 h.p., 440/460 V, d.c. motor by Mather and Platt. Compound wound, 840/750 amp, open protected type. Speed 1,000 r.p.m.

Two 120 h.p., 460 V, d.c. motors by E.C.C. Pipe ventilated. Speed 530 r.p.m. Each with Brookhirst control pillar.

65 h.p. 420/460 V, d.c. motor by Westinghouse. Compound wound, speed 500/750 r.p.m.

200 h.p., 220/230 V, d.c. motor by Mather and Platt. Open protected type. 500/750 r.p.m.

175 h.p., 220 V, d.c. motor by Greenwood and Batley. Compound interpole. Speed 370 r.p.m.

75 h.p., 220 V, d.c. motor by Met-Vick. Shunt interpolar wound with series stability windings. Speed 314 r.p.m.

George Cohen, Sons and Co., Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070), and Stanningley, near Leeds (Tel.: Pudsey 2241). (K 427)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co. Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

1 H.P. ELECTRIC MOTOR S.P., 230 V. Good condition. £15.—Lad 3084. (K 431)

BUSINESSES FOR SALE

FULLY FITTED ELECTRICAL EQUIPMENT FACTORY for Sale Freehold. Site area approx. 1 acre, covered space approx. 16,000 sq. ft. situated approx. 30 miles from London; skilled labour available. Price, including all fixtures, machine tools, loose and fixed equipment, £45,000.—Full details, apply J. P. Kane, F.A.L.P.A., 46 Dover Street, London, W.1. Telephone No.: Regent 5173. (K 446)

MISCELLANEOUS

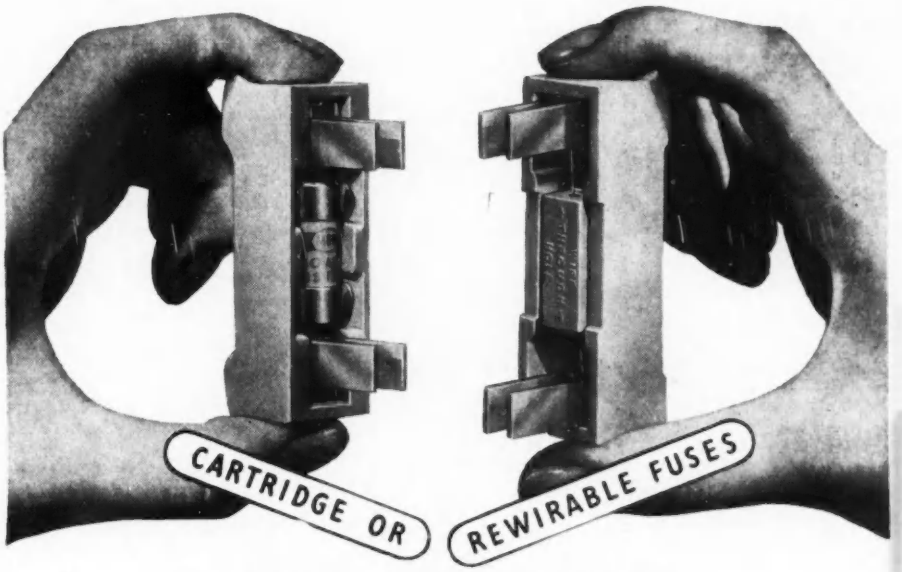
CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 176-page handbook, FREE and post free. B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 244)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)

UNIVERSITY OF LONDON. A course of four lectures on "The Use of Carrier Currents for Control, Protection and Communication in Power Systems" will be delivered by M. André Chevallier (Electricité de France) at 5.30 p.m. on April 25, 27 and 30, and May 2, at King's College, Strand, W.C.2.

ADMISSION FREE, WITHOUT TICKET

JAMES HENDERSON,
Academi Registrar.
(K 433)



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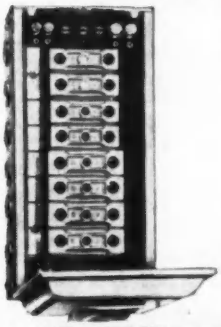

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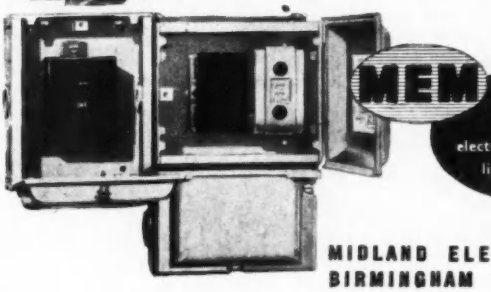

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INDEX TO ADVERTISERS

A. E. W., Ltd. 20
Aerialite, Ltd. 17
Alton Battery Co., Ltd. 11
Ashdowns, Ltd. 66
Austin & Hayes, Ltd. 76

Babcock & Wilcox, Ltd. 9
Belling & Co., Ltd. 6
Bevgree, Ltd. 74
Bill Switchgear, Ltd. 5
Brentford Transformers, Ltd. ... 13
British Electric Lamps, Ltd. ... 60
British Industries Fair 75
British Insulated Callender's Cables, Ltd. 23, 39
British National Electrics, Ltd. ... 42
British Plastics 69
British Thomson-Houston Co., Ltd. 46
Brook Motors, Ltd. 60
Brownings' Electric Co., Ltd. ... 18
Brush Electrical Engineering Co., Ltd. 77
Burn, George, Ltd. 14

Carter, B. & F., Co., Ltd. ... 76
Clang, Ltd. 72
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. ... 21

Daleman, Richard, Ltd. 60
Desoutter Bros., Ltd. 65
D.P. Battery Co., Ltd. 70
Drake & Gorham Wholesale, Ltd. 74
Drummond, John, (Engineers), Ltd. 76

Edison Swan Electric Co., Ltd. ... 2
Ega Electric, Ltd. 76
Electric Construction Co., Ltd. ... 22
Elexcel Ltd. 25
Ellison, George, Ltd. 44
E.M.I Institutes 14
English Electric Co., Ltd. 3, 29
Erskine, Heap & Co., Ltd. ... 40

Ferguson Pailin, Ltd. 27
Ferranti, Denis Co., Ltd. ... 74
Ferranti, Ltd 61
Foster Transformers & Switchgear, Ltd. 35
Funditor, Ltd. 62

General Cable Manufacturing Co., Ltd. 12
General Electric Co., Ltd. 8, 37
Glover, W. T., & Co., Ltd. ... 63
Grubb Engineering Co., Ltd. ... 58

Hackbridge Cable Co., Ltd. ... 4
Hackbridge & Hewittic Electric Co., Ltd. 47
Heayberd, F. C., & Co., Ltd. ... 68
Henley's W.T. Telegraph Works Co., Ltd. 1
Heyes & Co., Ltd. 64
Hick, Hargreaves & Co., Ltd. ... 80
Hotpoint Electric Appliance Co., Ltd. 38

Johnson & Phillips, Ltd. 33

Kempston Electrical Co., Ltd. ... 74

Lancashire Dynamo & Crypto, Ltd. 71
Low, Duncan, Ltd. 4

Measuring Instruments (Pullin), Ltd. 58
Mersey Cable Works, Ltd. ... 28
Metallic Seamless Tube Co., Ltd. 48
Metropolitan-Vickers Electrical Co., Ltd. 41, 73
Metway Electrical Industries, Ltd. 14
Midland Electric Manufacturing Co., Ltd. 57
M.K. Electric, Ltd. 67

Nettle Accessories, Ltd. ... 80

Parnall (Yate), Ltd. 79
Partridge, Wilson & Co., Ltd. ... 66
Pirelli-General Cable Works, Ltd. 59
Premier Electric Heaters, Ltd. ... 16
Pritchett & Gold & E.P.S. Co., Ltd. 43

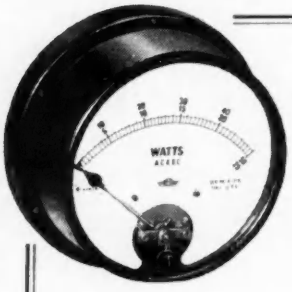
Renfrew Foundries, Ltd. ... 19
Revo Electric Co., Ltd. 30, 31
Reyrolle, A., & Co., Ltd. ... 15
Rheostatic Co., Ltd. 32
Rowlands Electrical Accessories, Ltd. 78

Sanders, Wm., & Co. (Wednesbury), Ltd. 72
Shell Mex & B.P., Ltd. 7
Siemens Schuckert (Great Britain), Ltd. 18
Simplex Electric Co., Ltd. ... 26
Smith, Frederick, & Co. 10
Sperryn & Co. 34
Stainless Steel Wire Co., Ltd. ... 20
Standard Telephones & Cables, Ltd. 36
Statter, J. G., & Co., Ltd. ... 72
Streamline Filters, Ltd. 34
Sunvic Controls, Ltd. 24
Symonds, R. H., Ltd. 70

V. G. Manufacturing Co., Ltd. ... 72

Weir, G. & J., Ltd. 24
Wilcox, Edward, & Co., Ltd. ... 64

Zenith Electric Co., Ltd. ... 62



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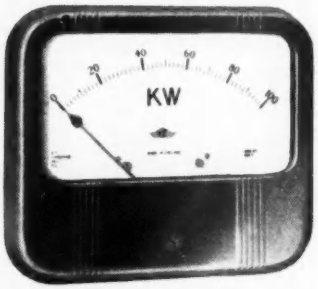

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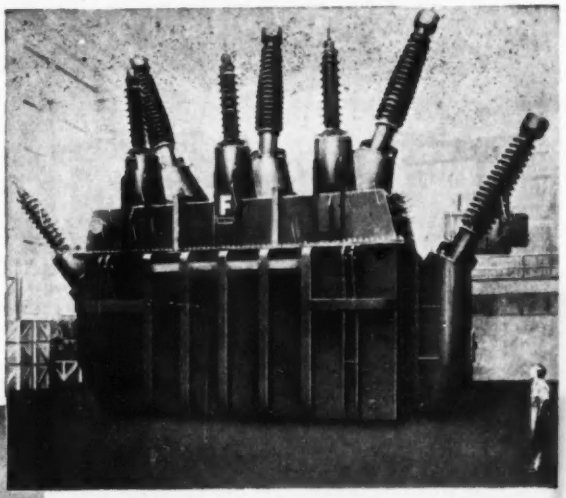

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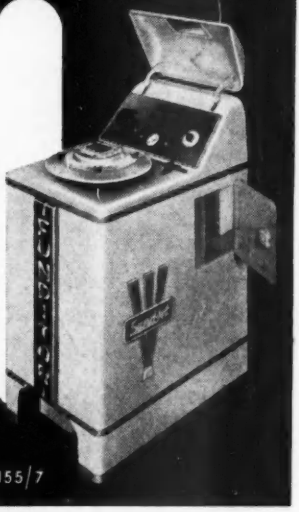

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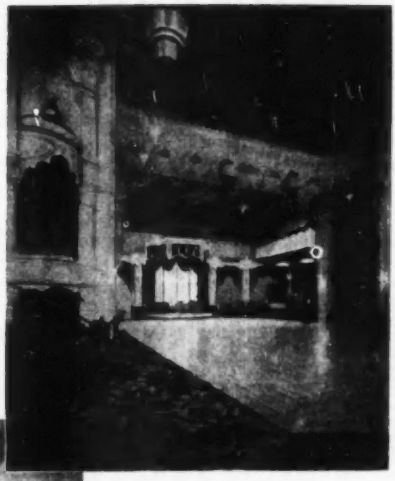

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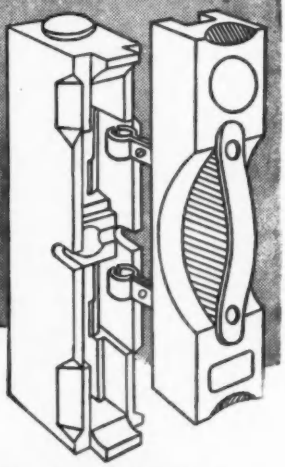

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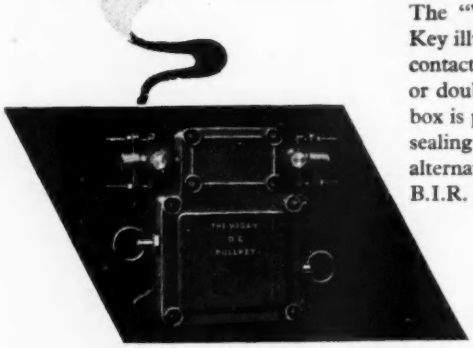

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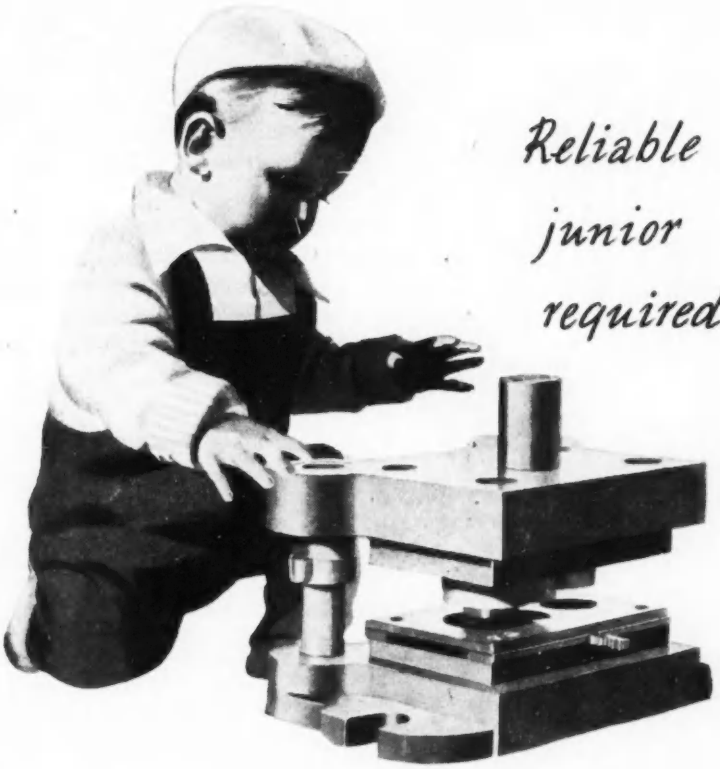

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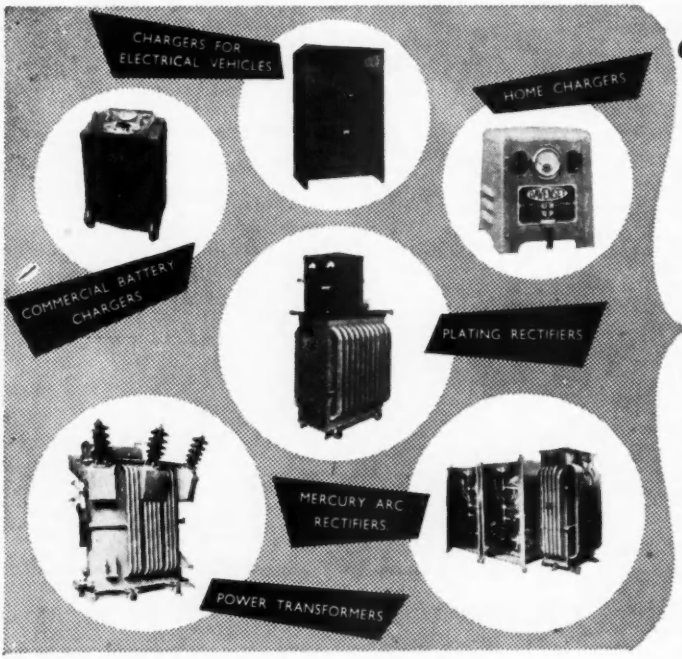

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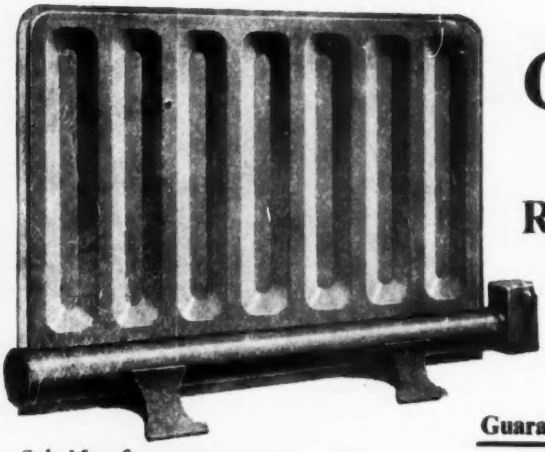

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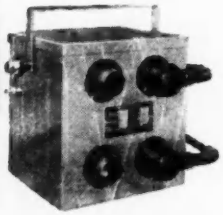

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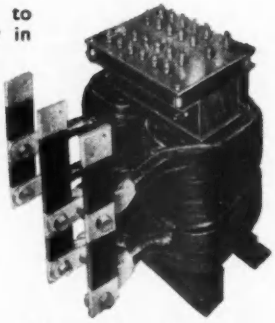

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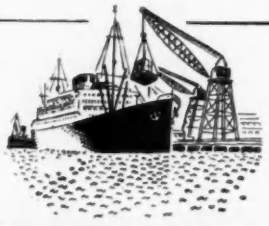

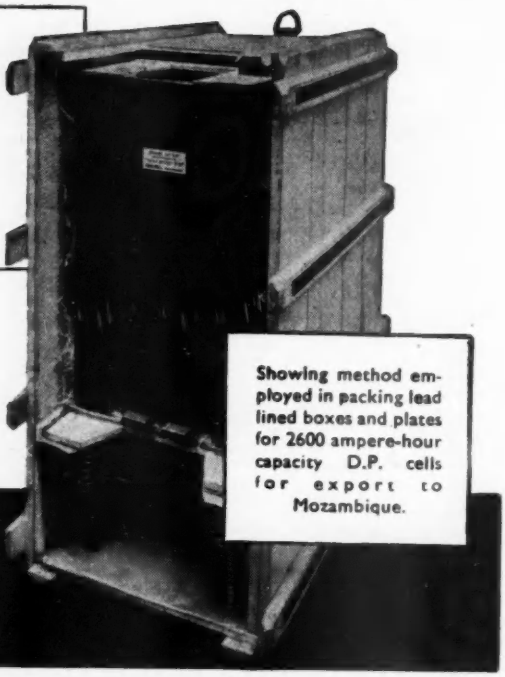

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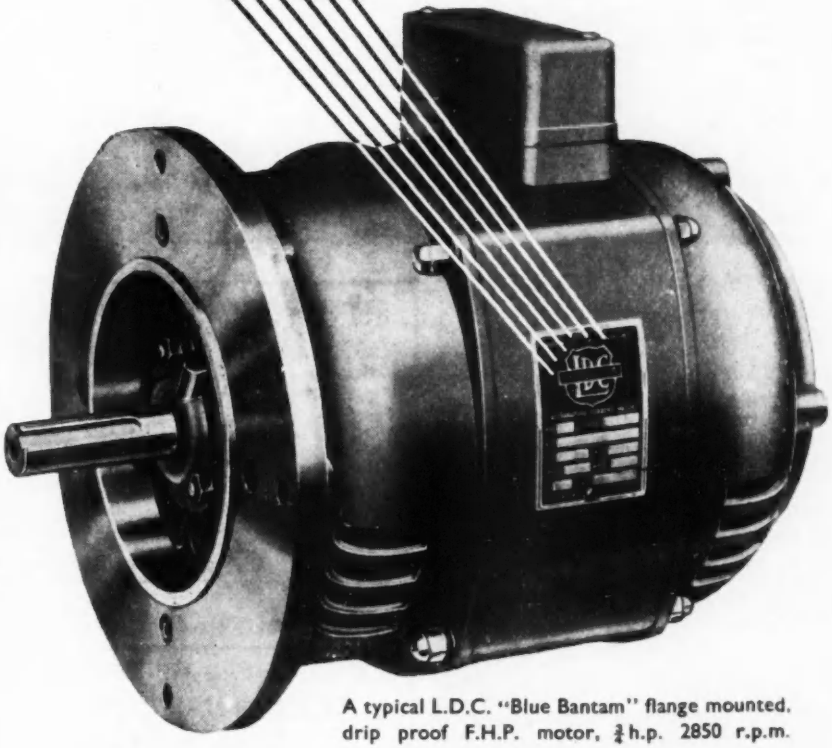

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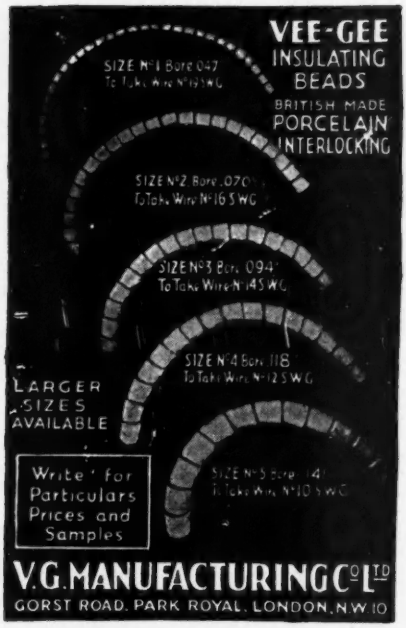

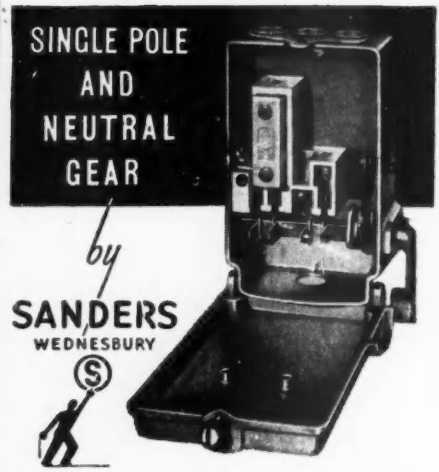

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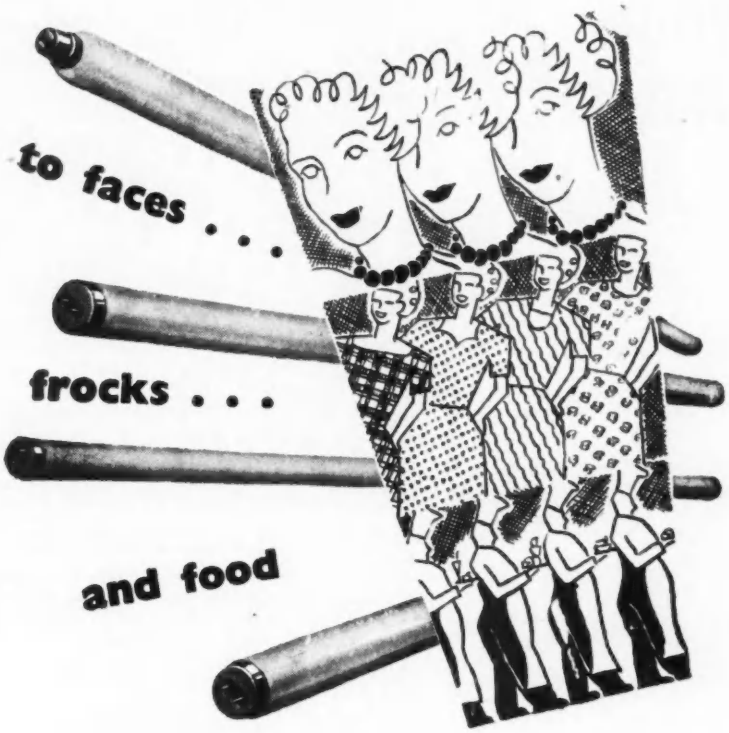

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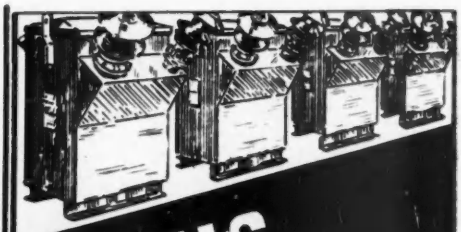

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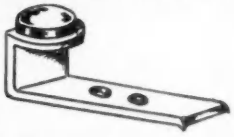

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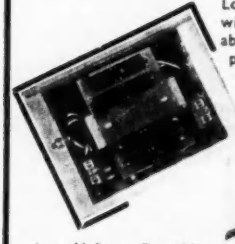

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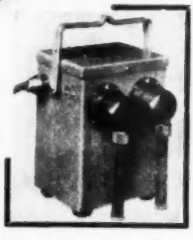

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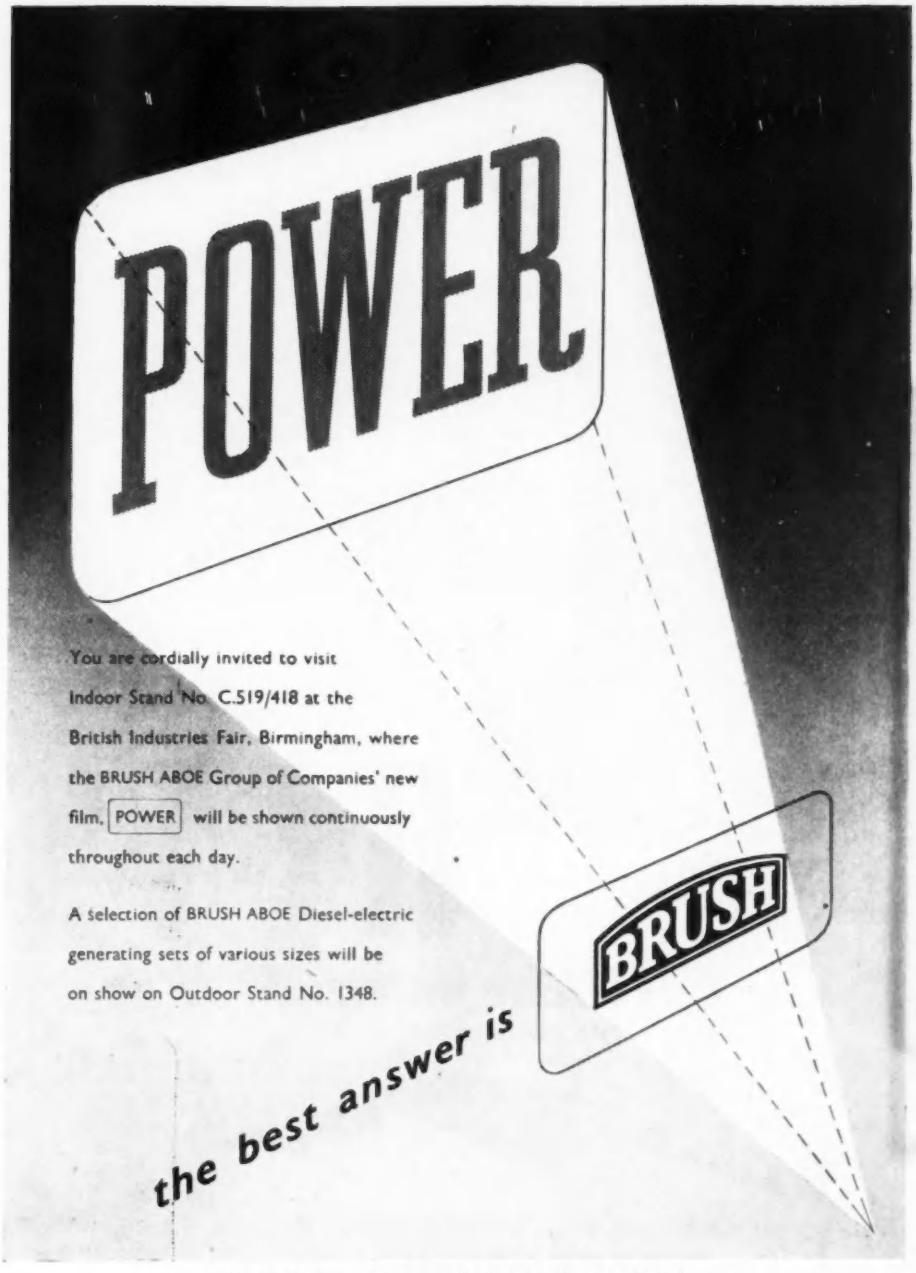
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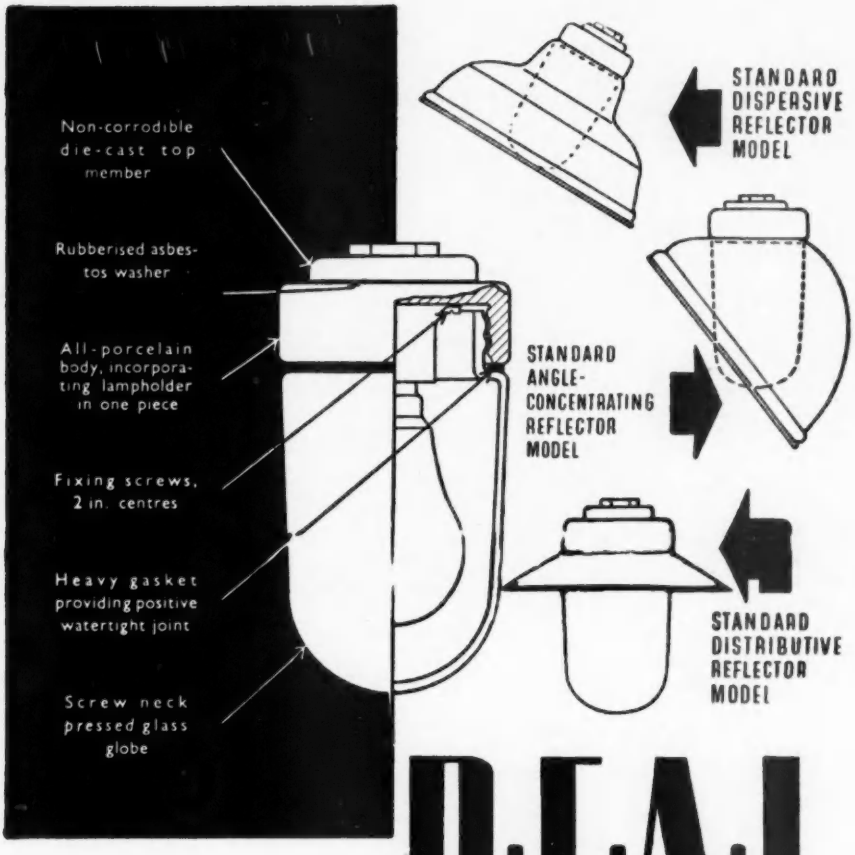
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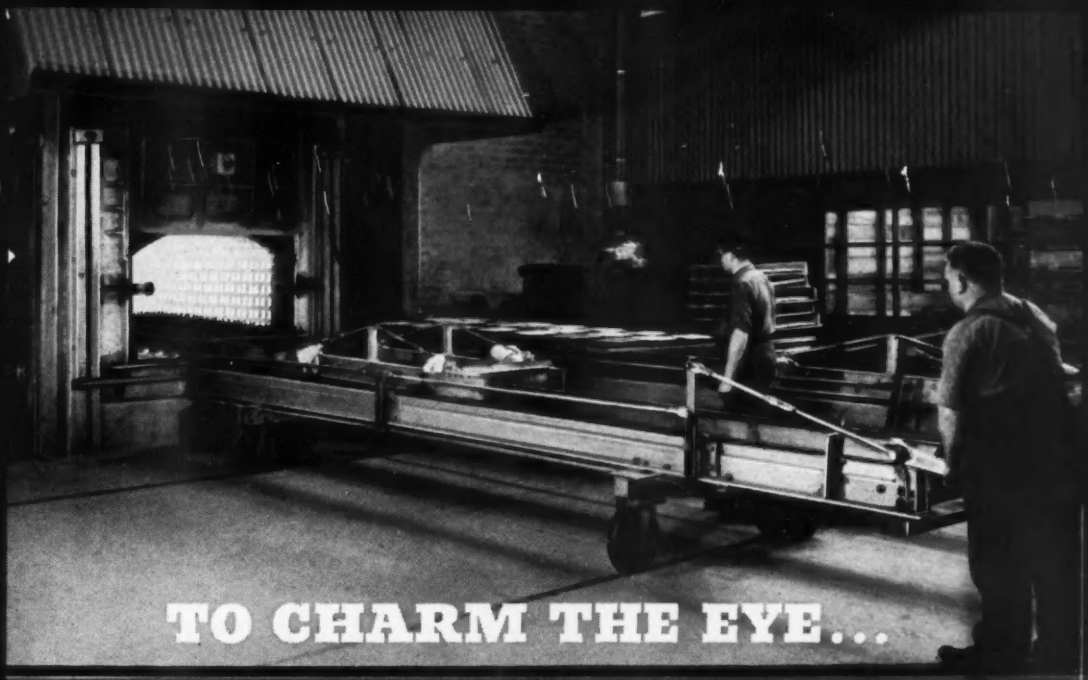

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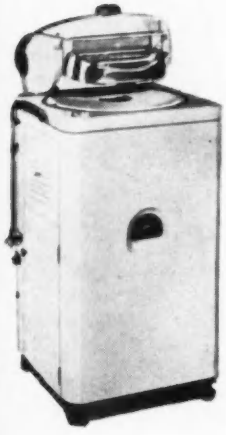

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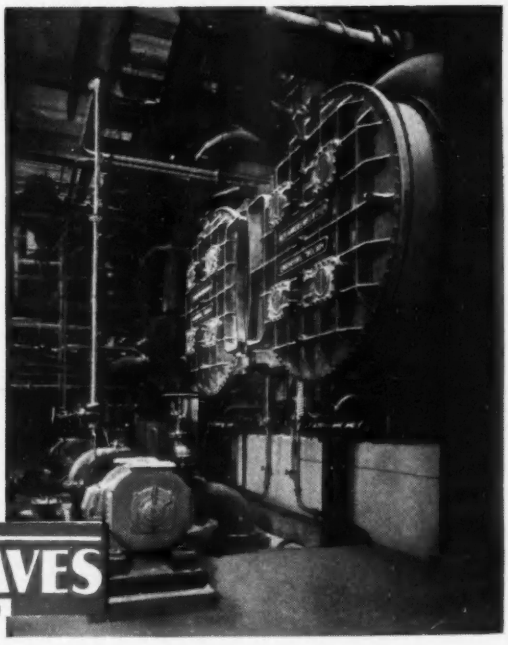

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